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A Report of Health Status of University Staffs According to the Work Classification

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ABSTRACT

This study was conducted to evaluate the health status of staff by medical examination data according to the work classification as professional, office worker and laborer in K University in Seoul, Korea. Two thousand four hundred and eighty-four staff (men : 1154, female : 1330) from the university were studied for this report. The anthropometric (height, weight and BMI) and blood pressure (systolic, diastolic) and biochemical parameters (hemoglobin, glucose, cholesterol, AST, ALT) were measured. All groups were calculated using GLM multivariate analysis for three groups after adjustment for age. The average BMI was significantly higher in laborers than professionals and officers after adjustment for age. In blood pressure, especially in SBP, the significant difference was found in females according to the job classification. Blood glucose levels of female laborers were significantly higher than those of officers and professionals. The level of blood total cholesterol of male professionals was significantly higher than those of laborers. The level of blood total cholesterol of female laborers was significantly higher than officers or professionals. Importantly, significant differences were found in BMI, SBP, blood glucose level and cholesterol level of female staff after adjustment for age. These results showed that there were differences in health subjects of staff according to the work classification. This study would provide basic data to prepare the program of health promotion for the college staff according to work classification. Further research is required to discover factors influencing health promotion of staff in colleges. (*J Community Nutrition* 7(3) : 135~140, 2005)

KEY WORDS : health status · university staff · medical examination · job classification.

Introduction

Healthy people, especially healthy workers at the workplace, are important for the promotion of national development. The health concerns at the worksite have changed in the recent century. Regular medical examinations at the workplace have been a part of the public health policy and targeted to improve the health status and quality of life (Byen 1995), to reduce the risk for chronic diseases, and to improve the nutritional status. Also, an enterprise for health improvement within the public health strategy has significant meaning in the ways of a developed country in the 21st century (Aldana, Pronk 2001). The public demands more health promotion programs as distinct from the modern medical practice prevalent in health care (Blair, Smith 1986).

The study found that an association could be accounted for occupation, education or income (Muntaner et al. 1998 ; Wohlfarth 1997). People need to practice health-promoting behaviors in their daily lives to enhance their well-being (Morrison, Hark 1996). Industrial nursing makes a very important contribution to community health promotion programs in modern industrial societies and countries (Riedel et al. 2001).

Many questions still remain unanswered regarding the potential associations between various types of employment and health, the part played by potential modifying variables such as individuals (for example, age, gender) and environmental factors (for example, working classification) (Muntaner et al. 1998).

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University employees are often classified into professional, officers and laborers. Professional personnel hold a different position, although their work pace is high, they often regard their work as being challenging and interesting, with broad decision latitude and autonomy (Houtman et al. 1994 ; Wright 2000). In Karasek's model (1979) the group falls under the active jobs catergory it can be assumed that these people run less risk of negative health effects than those who have highly demanding jobs with less decision latitude and less interesting work.

In this report, therefore, we investigated anthropometric and biochemical characteristics to explain the effects or differences of health status among university staff according to work classification (professional, officer, and laborer).

Subjects and Methods

1. Subjects

Subjects were the staff of the K University in Seoul, South Korea. The data was gathered from the latest medical examination (from the year of 2003 to 2004) at the department of industrial medical science in K Medical Center. The total number of subjects was 2,649 (male : 1273, female : 1376). However, the data from 162 staff was excluded because of the missing data. Therefore, the total number of the subjects for the data analysis was 2484 people (male : 1154, female : 1330).

2. Contents of the medical examination

The height and body weight of the subjects were measured and the body mass index (BMI, kg/m^2) was calculated. Systolic blood pressure (SBP) and diastolic blood pressure (DBP) were measured using an electronic device (Omron HEM-412C, Vernon Hills, IL, USA). The levels of hemoglobin, blood glucose, blood total cholesterol, aspartate transferase (AST), and alanine transferase (ALT) were measured from the 12-hour, overnight fasting, blood.

3. Statistical analysis

All data was analyzed by SAS PC 8.0 (Statistical Analysis System) system. All values such as means and standard deviations were expressed as means ± SD. P values were calculated using GLM multivariate analysis for three groups after adjustment for age. The significances among the variables were verified by t-test, one way ANOVA and χ^2-test.

Results and Discussion

1. Anthropometric measurements and blood pressure of the subjects

Table 1 illustrates the anthropometric measurements and blood pressure of the subjects. The average age of the subjects was 39.7 ± 10.7yrs (male : 43.9 ± 10.4yrs, female : 36.0 ± 9.4yrs). The average height of males was 170 ± 5.7 cm and that of females was 159.4 ± 5.0cm. The average weight of males was 70.6 ± 9.3kg and that of females was 54.7 ± 7.0kg. *P* values were calculated using GLM multivariate analysis for three groups after adjustment for age. When the data was sorted according to the job classifications such as professional, officer and laborer, there were significant differences showing that male professionals were taller than officers and laborers ($p = 0.028$) and female laborers weighed more than professionals and officers did ($p = 0.0023$). The mean body mass index (BMI) for males was 24.3 ± 2.7 kg/m^2 and that of female subjects was 21.5 ± 2.8kg/m^2. In the case of male, the mean value of BMI was above the normal range (18.5 − 22.9kg/m^2). Otherwise, those of female were in the normal range even though BMI of laborers

Table 1. Anthropometric measurements and blood pressure of the subjects according to work classification

	Male				Female			
	Professional	Officer	Laborer	Subtotal	Professional	Officer	Laborer	Subtotal
N	558	481	114	1153	940	275	114	1329
Age (yr)	43.1 ± 11.6	44.8 ± 9.1	44.0 ± 9.0	43.9 ± 10.4	34.3^b ± 8.4	36.8^c ± 9.8	48.9^a ± 6.0	36.0 ± 9.4
Height (cm)	170.9^a ± 5.5	169.9^b ± 5.8	169.7^b ± 6.0	170.4 ± 5.7	159.9 ± 4.7	158.9 ± 5.3	156.4 ± 4.9	159.4 ± 5.0
Weight (kg)	71.0 ± 8.1	70.4 ± 9.2	69.1 ± 9.5	70.6 ± 9.3	54.1^b ± 6.7	54.9^b ± 7.3	59.1^a ± 7.4	54.7 ± 7.0
BMI (kg/m^2)	24.3 ± 2.5	24.4 ± 2.8	24.0 ± 2.9	24.3 ± 2.7	21.2^c ± 2.5	21.8^b ± 2.8	24.1^a ± 2.8	21.5 ± 2.8
SBP (mmHg)	128.6 ± 12.7	130.3 ± 14.5	127.7 ± 13.8	129.2 ± 13.6	112.0^c ± 9.8	118.9^b ± 13.5	123.5^a ± 13.8	114.4 ± 11.7
DBP (mmHg)	79.1 ± 9.2	79.7 ± 10.6	77.3 ± 10.3	79.2 ± 10.0	70.5^b ± 7.6	73.5^a ± 13.8	72.9^a ± 9.9	71.1 ± 8.2

1) *p* values were calculated using GLM multivariate analysis for three groups after adjustment for age.
2) Date are mean ± standard deviations

(BMI = 24.1kg/m^2) was higher than those of professionals (BMI = 21.2kg/m^2) and officers (BMI = 21.8kg/m^2) ($p = 0.0001$).

The mean systolic blood pressure (SBP) for males and females was 129.2 ± 13.6mmHg and 114.4 ± 11.7mmHg, respectively. In the case of male subjects, the average SBP was higher than the normal value (SBP < 120mmHg). Otherwise, the average SBP for female subjects was in the normal range; however, SBP of laborers (SBP = 123.5mmHg) was higher than the normal value and significantly higher than those of professionals (SBP = 112mmHg) and officers (SBP = 118.9mmHg). The mean diastolic blood pressure (DBP) was 79.2 ± 10.0mmHg for males and 71.1 ± 8.2 mmHg for females. In case of females, the average of DBP was in the normal range, however, that of officers (DBP = 73.5mmHg) and laborers (DBP = 72.9mmHg) was higher than that of professionals (DBP = 70.5mmHg).

2. Distribution of the subjects by body mass index according to work classification

Figs. 2 and 3 show the distribution of the subjects by body mass index according to work classification. *P* values were calculated using GLM multivariate analysis for three groups after adjustment for age. The range of body mass index was distinguished in normal (< 23kg/m^2), over weight (23 − 24.9 kg/m^2) and obesity (> 25kg/m^2). The number (percentage) of male subjects was 354 (30.7%) normal, 342 (29.7%) overweight and 457 (39.6%) obesity. The number (percentage) of female subjects in each category was 983 (74.1%), 204 (15.4%) and 139 (10.5%), respectively. Significant difference was found in the case of female subjects according to the work classification ($p < 0.0001$). Otherwise, no difference was found in male subjects.

In case of male subjects, 69.3% were overweight or obesity category. Otherwise, only 26.9% of the female subjects were in those categories. Interestingly, in the case of females, the percentage of overweight and obesity was about 64% in labor work compare to only 15.9% in professional and 26.2% in office work.

3. Distribution of the subjects by systolic and diastolic blood pressure according to work classification

Table 2 shows the distribution of the subjects by blood pressure according to work classification. *P* values were calculated using GLM multivariate analysis for three groups after adjustment for age. The ranges of systolic blood pressure were distinguished by normal (< 130mmHg), borderline (130 − 139mmHg) and hypertensive (> 140mmHg). The range of blood pressure (SBP, DBP) was distinguished by the seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure (2003). The number (percentage) of male subjects was 614 (53.3%) normal, 299 (26.0%) borderline and 239 (20.7%) hypertensive. The number (percentage) of female

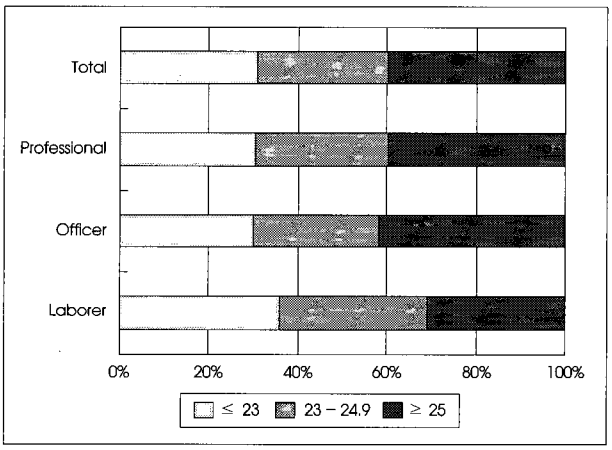

Fig. 1. Distribution of the male subjects by body mass index according to work classification. The range of body mass index was distinguished as normal (< 23 kg/m^2), over weight (23 – 24.9 kg/m^2) and obesity (> 25 kg/m^2) by the clinical guidelines for the treatment of obesity in Korean Society for the Study of Obesity (2003). The percentages (number) of male subjects was 30.7% (354), 29.7% (342) and 39.6% (457), respectively. Significant difference was not found in the male subjects. *P* values were calculated using GLM multivariate analysis for three groups after adjustment for age.

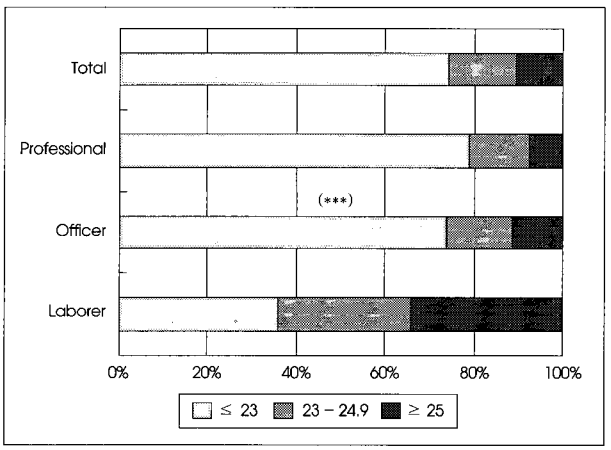

Fig. 2. Distribution of the female subjects by body mass index according to work classification. The range of body mass index was distinguished as normal (< 23 kg/m^2), over weight (23 – 24.9 kg/m^2) and obesity (> 25 kg/m^2) by the clinical guidelines for the treatment of obesity in Korean Society for the Study of Obesity (2003). The percentages (number) of female subjects was 74.1% (983), 15.4% (204) and 10.5% (139), respectively. *** : Significant difference was found in the female subjects ($p < 0.0001$). *P* values were calculated using GLM multivariate analysis for three groups after adjustment for age.

subjects was 1187(89.3%), 97(7.3%) and 45(3.4%), respectively. In case of female subjects, significant difference was found according to work classification ($p < 0.0306$). Otherwise, no significant difference was found in male subjects. 46.7% of the male staff were borderline or hypertensive. Otherwise, only 10.7% of the female subjects were borderline or hypertensive.

The range of diastolic blood pressure was also distinguished as normal(< 85mmHg), borderline(85 − 89mmHg) and hypertensive(> 90mmHg). The number(percentage) of male subjects was 816(70.8%) normal, 140(12.2%) borderline and 196(17.0%) hypertensive. The number(percentage) of female subjects was 1273(95.8%) 29(2.2%), 27 (2.0%), respectively. No significant difference was found in male and female subjects according to work classification. 29.2% of the male subjects were borderline or hypertensive. Otherwise, only 4.4% the female subjects were borderline or hypertensive.

4. Biochemical measurements of the subjects according to work classification

Table 3 shows the biochemical measurements of the subjects according to the job classifications. *P* values were calculated using GLM multivariate analysis for three groups after adjustment for age. The mean levels of hemoglobin (Hgb) were 15.4 ± 3.7mg/dL in male and 12.7 ± 1.1mg/dL in female subjects. No significant difference was found among the job classifications. These values were in the normal range in both subjects(normal range : male > 13mg/dL, female > 12mg/dL).

The mean blood glucose level was 94.1 ± 20.1mg/dL for males and 80.0 ± 17.4mg/dL for female subjects. There was a significant difference in female subjects among the work classifications showing that the blood glucose levels of laborer(90.3 ± 13.0mg/dL) was higher than those of officers (83.3 ± 11.9mg/dL) and professionals(77.8 ± 18.5mg/dL) ($p = 0.0001$). However, the mean of blood glucose levels was in the normal range(normal range : 80 − 110mg/dL).

The average blood total cholesterol levels were 196.4 ± 33.7mg/dL for males and 182.1 ± 32.5mg/dL for female subjects. There were significant differences not only in the male subjects($p = 0.0098$) but also in the female subjects ($p = 0.0001$) according to work classification. Blood cholesterol levels were the highest in professionals(198.6 ± 33.0 mg/dL) for male subjects and were the highest in laborers

Table 2. Distribution of the subjects by the blood pressure according to work classification

	Male					Female				
	Professional	Officer	Laborer	Subtotal	x^2 value	Professional	Officer	Laborer	Subtotal	x^2 value
SBP										
< 130(mmHg)	311(55.8)	241(50.1)	62(54.4)	614(53.3)		891(94.8)	221(80.4)	75(65.8)	1187(89.3)	
130 − 139	145(26.0)	123(25.6)	31(27.2)	299(26.0)	0.4737	40(4.3)	30(10.9)	27(23.7)	97(7.3)	0.0306
≥ 140	101(18.1)	117(24.3)	21(18.4)	239(20.7)		9(1.0)	24(8.7)	12(10.5)	45(3.4)	
DBP										
< 85(mmHg)	405(72.7)	329(68.4)	82(71.9)	816(70.8)		924(98.3)	250(90.9)	99(86.8)	1273(95.8)	
85 − 89	98(12.2)	61(12.7)	11(9.6)	140(12.2)	0.1970	7(0.7)	14(5.1)	8(7.0)	29(2.2)	0.3742
≥ 90	84(15.1)	91(18.9)	21(18.4)	196(17.0)		9(1.0)	11(4.0)	7(6.1)	27(2.0)	

1) *P* values were calculated using GLM multivariate analysis for three groups after adjustment for age.
2) SBP : systolic blood pressure, DBP : diastolic blood pressure
3) The range of blood pressure(SBP, DBP) was distinguished by the seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure(2003)

Table 3. Biochemical measurements of the subjects according to work classification

	Male				Female			
	Professional	Officer	Laborer	Subtotal	Professional	Officer	Laborer	Subtotal
Hgb(mg/dL)	15.5 ± 5.2	15.3 ± 1.0	15.3 ± 1.1	15.4 ± 3.7	12.7 ± 1.1	12.8 ± 1.0	12.6 ± 1.1	12.7 ± 1.1
Glucose(mg/dL)	93.8 ± 19.9	95.0 ± 20.9	91.5 ± 17.3	94.1 ± 20.1	77.8^{c} ± 18.5	83.3^{b} ± 11.9	90.3^{a} ± 13.0	80.0 ± 17.4
Cholesterol(mg/dL)	198.6^{a} ± 33.0	195.2^{ab} ± 34.7	190.3^{b} ± 32.1	196.4 ± 33.7	180.3^{b} ± 32.1	182.8^{b} ± 31.0	195.5^{a} ± 31.9	182.1 ± 32.5
AST(IU/dL)	24.3 ± 12.0	25.7 ± 9.8	25.9 ± 8.7	25.0 ± 10.8	20.2 ± 9.3	19.5 ± 5.8	20.7 ± 6.5	20.2 ± 8.5
ALT(IU/dL)	28.1 ± 21.5	28.7 ± 17.1	28.5 ± 15.9	28.4 ± 19.2	16.0 ± 13.7	16.2 ± 8.4	15.6 ± 7.1	16.0 ± 12.3

1) *P* values were calculated using GLM multivariate analysis for three groups after adjustment for age.
2) Date are mean ± standard deviations

Table 4. Distribution the subjects by blood glucose levels according to work classification

	Male					Female				
	Professional	Officer	Laborer	Subtotal	x^2 value	Professional	Officer	Laborer	Subtotal	x^2 value
<110mg/dL	496(89.0)	427(89.0)	104(91.2)	1027(89.2)		855(96.9)	267(98.2)	111(97.4)	1233(97.2)	
110 – 125mg/dL	41(7.4)	29(6.0)	6(5.3)	76(6.6)	0.3040	16(1.8)	3(1.1)	2(1.8)	21(1.7)	0.4410
≧ 126mg/dL	20(3.6)	24(5.0)	4(3.5)	48(4.2)		11(1.2)	2(0.7)	1(0.9)	14(1.1)	

1) *P* values were calculated using GLM multivariate analysis for three groups after adjustment for age.
2) The blood glucose levels were distinguished by the clinical guidelines for the treatment of diabetes in American Diabetes Association(1997)

(195.5 ± 31.9mg/dL) for female subjects. The average blood cholesterol level was in the normal range for both subjects (normal range : < 200mg/dl).

The mean aspartate transaminase(AST) and alanine transaminase(ALT) levels of male subjects were 25.0 ± 10.8 IU/dL and 28.4 ± 19.2IU/dL, respectively, and of female subjects were 20.2 ± 8.5IU/dL, 16.0 ± 12.3IU/dL, respectively. The average AST and ALT levels were in the normal range in male and female subjects(normal range : AST < 40 IU/dL, ALT < 40IU/dL).

5. Distribution of the subjects by blood glucose levels according to work classification

Table 4 shows the distribution of the subjects by blood glucose levels according to work classification. *P* values were calculated using GLM multivariate analysis for three groups after adjustment for age. The range of blood glucose level was distinguished by < 110g/dL, 110 – 125g/dL and 126 ≥ g/dL. The blood glucose levels were distinguished by the clinical guidelines for the treatment of diabetes(American Diabetes Association 1997). The number(percentage) of male subjects in each range was 1027(89.2%), 76(6.6%) and 48 (4.2%), respectively. The number(percentage) of female subjects was 1233(97.2%), 21(1.7%) and 14(1.1%), respectively. No significant difference was found in male and female subjects.

6. Distribution of the subjects by blood cholesterol levels according to work classification

Figs. 3 and 4 show the distribution of the subjects by blood cholesterol levels according to work classification. P values were calculated using GLM multivariate analysis for three groups after adjustment for age. The ranges of blood cholesterol levels were distinguished by < 200 mg/dL, 200 – 249 mg/dL and ≥ 250mg/dL. The range of cholesterol was distinguished by the clinical guidelines for the treatment of hyperlipidemia(Korean Society of Lipidology and Stheros-

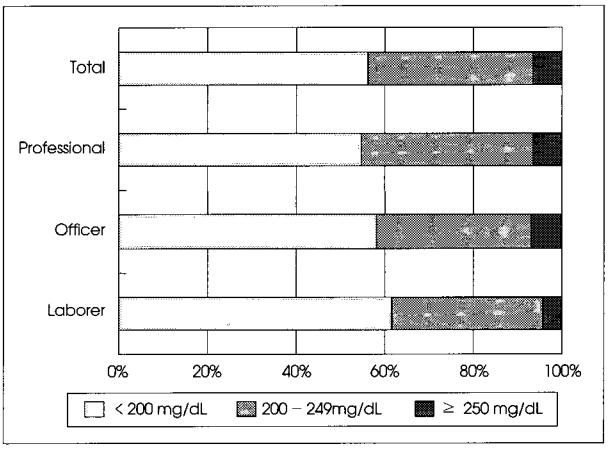

Fig. 3. Distribution of the male subjects by blood total cholesterol levels according to work classification. The range of chole-sterol was distinguished by the clinical guidelines for the treatment of hyperlipidemia in Korean Society of Lipidology and Atherosclerosis(2002). Distributions of the male subjects were 56.1%(645), 37.4%(430) and 6.5%(75). The significant difference was not found in male subjects. p values were calculated using GLM multivariate analysis for three groups after adjustment for age.

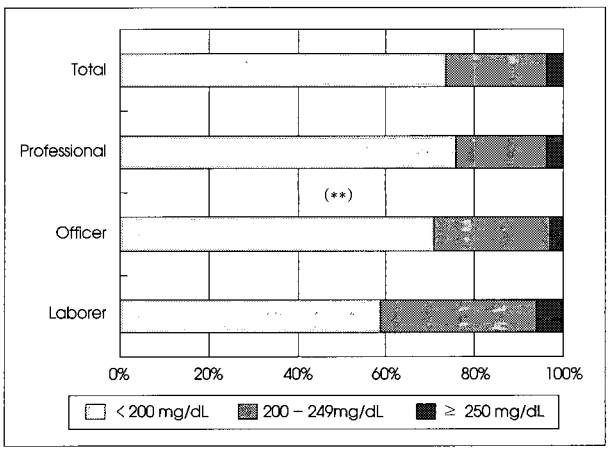

Fig. 4. Distribution of the female subjects by blood total cholesterol levels according to work classification. The range of cholesterol was distinguished by the clinical guidelines for the treatment of hyperlipidemia(Korean Society of Lipidology and Atherosclerosis(2002). Distributions of the female subjects were 73.3% (974), 23.0%(306) and 3.7%(49). (**) : The significant difference was found in the female subjects(p = 0.0033). *p* values were calculated using GLM multivariate analysis for three groups after adjustment for age.

clerosis, 2002). The number(percentage) of the male subjects for each range was 645(56.1%), 430(37.4%) and 75 (6.5%), respectively. The number(percentage) of female subjects was 974(73.3%), 306(23.0%) and 49(3.7%), respectively. About 46.9% of males and 26.7% of the females were in a risk range for hypercholesterolemia. Interestingly, in the case of female subjects, the percentage of greater than 200mg/dL was 41.2% in laborers compared to only 24.2% in professionals and 29.1% in office workers.

Summary and Conclusion

This study would provide basic data to prepare health improvement solutions for employees who were working for K University by investigating medical examinations according to job classification. This report investigated anthropometric and biochemical characteristics to explain the effects or differences of health status among university staff according to work classification(professional, officer, and laborer). All groups were calculated using GLM multivariate analysis for three groups after adjustment for age.

The anthropometric and blood pressure data showed that BMI of male staff was higher than normal value. 69.3% of males and 25.9% of females were either overweight or obese. In the case of BMI, the average BMI was significantly higher in laborers than professionals and officers. Furthermore, the percentage of overweight and obesity was 64% in laborers compared to 15.9% in professionals and 26.2% in office workers. These results indicate the obvious differences of health status among job classifications and between males and females. For blood pressure, especially in SBP, the significant difference was found in females according to job classification. Blood glucose levels of female laborer were significantly higher than those of officer and professional. According to the work classification, significant differences were found in male staff for the blood cholesterol levels. The levels of blood total cholesterol of male professionals were significantly higher than those of laborers. The levels of blood total cholesterol of female laborers were significantly higher than officers or professionals. For blood pressure and cholesterol levels, over 40% of males and 10% of females staff were above the borderline range. Importantly, the significant differences were found in BMI, SBP, blood glucose level and cholesterol level of female subjects.

These results showed that there were differences in the health status of staff according to work classification, even though this was not considered of socioeconomic status, dietary intake, physical activity, smoking et cetera. This study would provide basic data to prepare a program of health promotion for college staff according to work classification.

Further research is required to discover factors influencing health promotion of the staff in university. Future study should be involve the comparison data of socioeconomic status, dietary intake, physical activity and smoking, et cetera in job classification. This would be more comprehensible to explain the reasons of differences among job classifications.

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