

Relationship of Health Status and Health Care Utilization in Korean Adolescents According To Exercise Regularity

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Abstract : The purpose of this study was to find out the physical, mental health status and health care utilization of Korean adolescents according to exercise regularity using the forth Korean National Health and Nutrition Examination Survey from 2009 data. A total of 854 adolescents consisted of 444 boys and 410 girls, aged 12 to 18 years were classified into exercising male (EM), non-exercising male (NEM), exercising female (EF), and non-exercising female (NEF) groups. EM exhibited significantly higher weight ($P < .001$), waist circumference (WC) ($P < .01$) and body mass index (BMI) ($P < .001$) than NM. EF showed significantly greater height ($P < .01$), weight ($P < .01$), WC ($P < .001$), and BMI ($P < .001$) than NF. Mental health status of the subjects were as EF groups ($x^2 = 6.817, p < .05$) and subjective body awareness ($x^2 = 17.346, p < .05$) were significantly different. In addition, suicide ($x^2 = 1.848, p < .05$) and suicide attempts ($x^2 = 1.941, p < .05$) this woman youth to exercise on a regular basis for the difference were significantly lower. Male adolescents showed no significant difference there was no significant difference in the use of health care utilization of outpatient and pharmacy. However, there were no significant correlations between physical and mental status as well as utilization of health care with regularity of exercise. Therefore, practicing of ideal mental health and health care utilization status appears to be induced through physical activity and regular exercise in Korean adolescents.

Keywords: Health care utilization, Exercise regularity, 2009 KNHNES; Korean adolescent

I. Introduction

In Korea, some studies have explored adolescents' health status and behavior using the translated version of the Youth Risk health status and Behavior Survey from the Centers for Disease Control and Prevention (An & Tak, 2006; Byun & Lee, 2005). Some studies have used a Korean version of the Youth Risk Behavior Survey, but the research focused either on oral health behavior (Jung, Tsakos, Sheiham, Ryu, & Watt, 2010) or on nutrient intake (Cho, Nam, & Kim, 2011).

Exercise regularly rate of youth were conducted by 4th 3rd The Korea National Health and Nutrition Examination Survey (KNHNES) on 2009, in that 43.6% of youth are shown as usual and 56.4% were not exposed exercise regularity (MHOW, 2009). Regular exercise reduces the incidence of chronic degenerative diseases like high blood pressure, obesity, diabetes, and the fact that in relation to other risk factors such as abnormal lipid metabolism and serum interactions are well known (Heekyung Kim, 2006).

Exercise in adolescence is a critical issue that can affect adults as well as the incidence of diabetes, hypertension, and cardiovascular disease is a major health factors. Korean youths spent majority of the school life with preparation of entrance exam, coaching classes and admission competencies in reputed universities. So, they spend most of the time in front of the desk, it leads physical and mental stress and study burden. All those factors are influencing lack of physical exercise among adolescents (Mun Young hee, 2007). Low levels of physical activity (PA) and an increase in sedentary pursuits (e.g., television (TV) viewing, computer use) among youth has been implicated in the etiology of childhood obesity (Basterfield et al., 2012).

Exercise education reduced social effects of depression and anxiety, body image and self-esteem enhancement of mental aspects such as increasing the self-confident, independence and make individual high sense of real life improvement as well as the increased participation in social activities and health expenditure (Christmas & Andersen, 2000; Mun, Young Hee, 2007). Exercise gives not only to improve the level of physical and mental health by reducing the prevalence reduces the use of health care facilities (JeongYeongsuk; Choi Eunsuk; Lee Hyo young, 2010).

Exercise as physical activity implies all physical movement promoting actual energy consumption through the contraction of skeletal muscle [6]. Physical inactivity in adults provokes various chronic diseases and problems related to skeletal muscle, mental health, and the immune system along with obesity (Warburton DE, Nicol) and lack of physical activity in children and adolescents has been reported to increase relative risks of many diseases including obesity and metabolic syndrome (Körner A, Kratzsch J et.al 2008). Generally, physical activity declines continuously with age (Planinsec J, 2004). Therefore, helping children and adolescents, who do not have established patterns of physical activity, to acquire healthy habits for increasing

activity is useful in terms of public health, by leading to individual efforts to reduce occurrences diseases such as obesity, hypertension, and diabetes in adulthood (Kim YS, Kong, 2008)

The use of healthcare services varies according to factors such as age, gender, and health status, as well as perceptions of susceptibility, severity, and costs and benefits of seeking care. Socio-economic characteristics of the population, including income level, social class, or educational level may also have an impact on the use of services; this is also true of structural and functional aspects of the healthcare system, especially coverage, supply, access, and the quality of services provided.(campbell, 2000) Measuring adolescents' health service utilization and satisfaction plays an important role in the growing push towards accountability among health care providers and also can be used as an established indicator of quality of care.(Hoover Karen W et.all, 2010)

1.1. The purpose of the study

The purpose of this study by find out the physical, mental health status and health care utilization of adolescents between two groups divided according to exercise regularity by excessive, regular, medium and none. The Korea National Health and Nutrition Examination Survey 2009 was used by the researcher as a resource of data in order to find the strength of adolescent's exercise regularity and researcher wants to use as the basis and extend research in interventional approach in future in order to y improve the effective health behavioral habits of adolescents in South Korea.

1.2. Objectives

1. To analyzes the physical health according to the regular exercise difference.
2. To analyze the degree of mental health differences based on regular exercise.
3. To analyze the health care utilization in accordance with regular exercise.
4. To find out the relationship between the level of physical and mental health status and health care utilization in accordance with regular exercise.

1.3. Preoperational Definitions

1.3.1 Medium strength exercise regularly

The degree of physical activity and exercise, refers to the adequate exercise intensity and frequency on the effects on the real health, in chronic disease prevention dimension of 3 times per week, which presented the momentum, once 30 minutes or more moderate, saying a strong strength of at least movement in this study and exercise days of the week one time to exercise for sedentary persons courtyard the time in terms of the movement of a week for one week, also it means the case to enforce motion strength of at least 90 minutes or more.

1.3.2. Adolescents:

All young people in the age group of 15–19 years (age category of old adolescents)

1.3.3. Health care utilization

Health service utilization: use of the existing modern health services in different governmental and private health facilities by adolescents for their psychological, physical and social health problems whether it is for preventive or curative purpose

II. Materials And Methods

2.1 Study Design

This study is a descriptive research to identify the physical and mental health status and health care utilization in accordance with regular exercise of South Korean youths.

2.2. Subjects

This study was carried out using data from the 2009 KNHANES conducted by the Korea Centers for Disease Control and Prevention. The survey focused youths aged 12 to 18 years participants, data were collected in both the health questionnaire and screening survey. all subjects were classified into one of the following groups; exercising male group (EM), non-exercising male group (NEM), exercising female group (EF) and non-exercising female group (NEF) by determining whether to exercise extended over 90minutes per week and according to the criterion suggested by the American College of Sports Medicine (2006) for preventing chronic disease in sedentary people. For this, by using the number of day(s), and hours (mins) of exercise in a week. Exercises were calculate by designating intense and moderate physical activity and walking as 7, 5 and 4 mins, respectively. Using the calculated values, the male and female adolescents were divided into exercising groups that performed exercise that expended regular, irregular and extensive in the last one week or a control group that did not exercise, in the last one week. In other words,

2.3. Research Tools

2.3.1. Regular exercise

2009 National Health and Nutrition Examination Survey by using the 'health conscious behavior questionnaire for adolescents' physical activity weekly by excessive, moderate and less in terms of the exercise for a day, during of exercise calculated based on exercise if the intensity of the exercise at least 90 minutes or more per week and less than 90 minutes, shall be deemed not to exercise.

2.3.2 Assessment of physical health

To investigate the physical characteristics of the subjects, height, body weight, waist circumference and BMI were measured as well as final values of systolic and diastolic blood pressure during the physical examination survey and Biochemical assessment by levels of glucose, TC (total cholesterol), HDL-C (high density lipoprotein cholesterol), TG (triglyceride) value were assessed by national examination survey.

2.3.3. Assessment of Mental health status

To analyze the mental health by questionnaire of subjective health status, body image, perception of stress, depression(frequency for 2weeks), thought of suicide (for 1year), attempt to suicide (for 1year), and consult to Mental problem were assessed by examination survey.

2.3.4. Assessment of health care utilization

The answer results for the examination survey questions were assessed admission at hospital for past 1year, outpatient department visit (for 1year) and use of medical store (for 1 year) about the medical use of the "Year of National Health and Nutrition Examination Survey 2009".

2.4. Data analysis

Data is analyzed using the SPSS package (version 17.0) and specific data analysis method is as follows. Subject composition was analyzed using frequency analysis and differences in all variables between EM and NEM and between EF and NEF, and was verified using independent sample t-tests for continuous variables and Chi-square tests for categorized variables. To analyze the correlation of regular exercise, and the relationship between physical and mental health status, health care utilization were analyzed by Pearson Correlation Coefficient(r) was calculated. Differences were considered statistically significant at $P < 0.05$

III. Results

3.1 Comparison of level of Regular exercise:

The composition of the study subjects is shown in (Table 1) according to a regular exercise configuration. The 854 adolescents consisted of 444 boys (52%) and 410 girls (48%). Among them 271 boys (31.7%) and 131 girls (15.3%) responded that they performed regular exercise 90 minutes per week. While 173 boys (20.3%) and 279 girls (32.7%) did not exercise or performed exercise that expended less than 90 minutes per week ($P < 0.001$).

<table 1> Comparison of the Subjects

Variable		Regularity exercise		Total
		Male	Female	
Gender	Yes	271 (31.7%)	131 (15.3%)	402 (47.1%)
	No	173 (20.3%)	279 (32.7%)	452 (52.9%)
Total		444 (52%)	410 (48%)	854 (100%)

3.2 Comparison of physical characteristics

Physical health status of the subjects was as follows (table 2). In NEF were appeared significantly higher in weight, waist circumference, BMI, body mass index in the exercise, than EF male adolescents to exercise on a regular basis is a significantly higher BMI ($p < .05$). Per minute heart rate were regular male adolescents significantly lower than the exercise of biochemical health indicators TC (total cholesterol) showed a significantly lower when compared to the differences between male and female, but not entirely non-exercise group and the exercise group. ($P < .05$).

<table 2> Physical health status of the Subject according to exercise regularity

Variable	Male		Female		total	
	EG	NEG	EG	NEG	EG	NEG
Height (Cm)	169.35 ± 9.09	169.66 ± 9.14	159.57 ± 5.58	159.68 ± 5.68	166.16 ± 9.37***	163.55 ± 8.65
Weight (Kg)	61.99 ± 13.13	60.45 ± 13.09	54.47 ± 9.76*	51.64 ± 9.35	59.54 ± 12.63***	55.01 ± 11.73
Waist cir (Cm)	72.95 ± 9.59	71.65 ± 9.02	69.19 ± 8.58*	67.22 ± 7.37	71.72 ± 9.44***	68.92 ± 8.32
BMI (Kg/M2)	21.47 ± 3.56*	20.83 ± 3.83	21.33 ± 3.29*	20.17 ± 3.11	21.43 ± 3.48***	20.42 ± 3.23
Obesity (%)	-7.6 ± 16.12*	-3.89 ± 14.89	1.69 ± 15.59***	-4.00 ± 14.56	.03 ± 15.97***	-3.96 ± 14.67
HR (beat/min)	73.76 ± 10.81*	76.65 ± 11.56	78.02 ± 10.82	78.80 ± 11.58	75.14 ± 10.98***	77.97 ± 11.60
FBS (mg/dL)	89.31 ± 6.56	89.17 ± 6.37	87.82 ± 5.69	87.44 ± 6.32	88.83 ± 6.32	88.10 ± 6.39
T- cholesterol (mg/dL)	151.39 ± 27.75	151.35 ± 28.70	161.37 ± 25.85	162.74 ± 26.64	154.64 ± 27.54*	158.38 ± 27.97
HDL- cholesterol (mg/dL)	51.39 ± 10.59	50.64 ± 9.78	55.60 ± 10.58	55.10 ± 10.43	52.76 ± 10.76	53.39 ± 10.41
Triglyceride (mg/dL)	85.75 ± 54.62	92.46 ± 51.91	89.24 ± 49.78	86.05 ± 43.69	86.88 ± 53.07	88.50 ± 47.06

3.2.1 Comparison of biochemical metabolic profile data :

The subjects' biochemical metabolic profile data are shown (table 2), TC, TG, hemoglobin, and hematocrit were not significantly different between groups

3.3 Comparison of mental health characteristics

The level of mental health differences compared to regular exercise, according to a regular exercise Mental health conditions of the subjects were as follows (table 3). Regular awareness of the subjective health status in the women's movement groups ($\chi^2 = 6.817, p < .05$) and subjective body awareness ($\chi^2 = 17.346, p < .05$) were significantly different for. The more exercise appeared to be healthy and slim recognition. In addition, suicide ($\chi^2 = 1.848, p < .05$) and suicide attempts ($\chi^2 = 1.941, p < .05$) this woman youth to exercise on a regular basis for the difference were significantly lower. Male adolescents showed no significant difference.

<table 3 > Mental health status of the Subject according to exercise regularity

Characteristics	classification	Male		χ^2 xp	Female		χ^2 xp	total
		EM	NEM		EF	NEF		
subjective health status	very good	45	23	3.264 .086	22	28	6.817 0.034*	118
		16.6	13.3		16.8	10.0		138
	good	153	90		74	154		471
		56.5	52.0		56.5	55.2		552
	ordinary	59	48		28	73		208
		21.8	27.7		21.4	26.2		244
bad	14	12	6	23	55			
	5.2	6.9	4.6	8.2	64			
subjective body image	slightly thin	65	46	3.694 .159	14	47	17.346 .001*	172
		24.0	26.6		10.7	16.8		201
	ordinary	115	66		58	144		383
		42.4	38.2		44.3	51.6		448
	slightly obesity	59	39		52	62		212
		21.8	22.5		39.7	22.2		248
obesity	16	6	7	17	46			
	5.9	3.5	5.3	6.1	54			
perception of stress	very much	9	9	5.799 .814	8	14	.387 .867	40
		3.3	5.2		6.1	5.0		47
	much	68	32		31	65		196
		25.1	18.5		23.7	23.3		23.0
	slightly	141	106		67	150		464
		52.0	61.3		51.1	53.8		543
almost not	53	26	25	50	154			
	19.6	15.0	19.1	17.9	180			
depression (frequency for 2wks)	yes	19	11	.071 .846	16	25	.377 .197	71
		7.0	6.4		12.2	9.0		83
	no	252	162		115	254		783
		93.0	93.6		87.8	91.0		91.7
thought of suicide (for 1yrs)	yes	24	18	.296 .350	19	56	1.848 .017*	117
		8.9	10.4		14.5	20.1		137
	no	247	155		112	223		737
		91.1	89.6		85.5	79.9		863

attempt to suicide (for 1yrs)	yes	0	1	1.702 .427	1	2	1.941 .016*	4
		0	.6%		.8	.7		5
	no	24	17		18	54		113
		58.5	41.5		13.7	19.4		132
	Non-applicable	257	155		112	223		737
		91.1	89.6	85.5	79.9	863		
consult to mental problem	yes	6	5	.200 .757	6	6	1.852 .148	23
		2.2	2.9		2.9	2.2		27
	no	265	168		125	273		831
		97.8	97.1		95.4	87.8		973
	total	271	173		131	279		854
%	100	100	100	100	100			

*p<.05, **p<.01

3.4 Comparison of Status of regular exercise and health care utilization

Health Care Utilization in accordance with regular exercise as shown (table 4). EM showed that regular exercise adolescents significantly less utilization of hospitalization than NEM group ($\chi^2 = 5.041, p < .05$). It indicates that. There is no significant difference in the use of outpatient and healthcare utilization and visit of pharmacy

<table 4> Health care utilization according to exercise regularity

Characteristics	classification	Male		χ^2	Female		χ^2	total	
		EM	NEM		EF	NEF			
Admission (for 1yrs)	experience	yes	12	17	5.041.030*	4	6	305.732	39
			44	98		31	22		46
		no	259	156		127	273		815
			95.6	90.2		96.9	97.8		95.4
	cause	disease	6	9	6.544.023*	1	3	2375.675	19
			22	52		8	1.1		22
		accident & poisoning	5	8		2	3		18
			18	46		15	1.1		21
		others	1	0		1	0		2
			4	0		2	0		2
OPD visit (for 22wks)	experience	yes	37	31	1.482.227	32	54	1.384.244	154
			137	179		210	194		180
		no	234	142		99	225		700
			86.3	82.1		75.6	80.6		820
	cause	disease	32	24	3.688.282	25	44	1.618.262	125
			118	139		19.1	15.8		14.6
		accident & poisoning	3	2		1	1		7
			1.1	1.2		8	4		8
		others	2	5		6	9		22
			.7	2.9		4.6	3.2		2.6
Drug Store	experience	yes	39	34	2.128.151	25	48	215.679	146
			144	197		19.1	17.2		17.1
		no	232	139		106	231		708
			85.6	80.3		80.9	82.8		82.9
	cause	disease	33	31	3.095.131	24	47	450.662	135
			122	179		18.3	16.8		15.8
		accident & poisoning	3	1		0	0		4
			1.1	.6		0	0		5
		others	3	2		1	1		7
			1.1	1.2		8	4		8
total	271	173	131	279	854				
%	100	100	100	100	100				

*p<.05, **p<.01

3.5. Correlation of Regular exercise, health status, relationship with medical and health expenses

The results of relationship between health status and health care utilization had shown (Table 5). Regular exercise subjective perception of health status ($r = .121, p < .01$), body weight ($r = .094, p < .01$), waist circumference correlated with ($r = .074, p < .05$) exhibited. The more exercise a high awareness of the health it seems to increase the body weight a was low. Depression and stress shows static relationship ($r = .285, p < .01$) that indicates more level of stress as well as depression.. The suicide ($r = .257, p < .01$) and depression ($r = .250, p < .01$) were staggered represents correlated with higher stress, depression and higher suicidal tendency. In addition, BMI is also height ($r = .235, p < .01$), body weight ($r = .867, p < .01$) and were correlated with waist circumference ($r = .885, p < .01$). While level of stress among subjective health status the indicated negative correlation ($r = -.130, p < .01$) seems to awareness of stress status

<table 5> Correlation among Research Variable

	변인	1	2	3	4	5	6	7	8	9	10
1	subjective health status	100									
2	stress	-.130**	100								
3	depression	.070*	.285**	100							
4	thought suicide	-.069*	.257**	.250**	100						
5	height	.001	-.011	.014	.115**	100					
6	body weight	-.038	-.016	.023	.063	.680**	100				
7	WC	-.053	.004	.040	.075*	.451**	.895**	100			
8	BMI	-.052	-.020	.014	.006	.235**	.867**	.885**	100		
9	health care utilization	-.157**	.020	-.003	-.024	.006	.003	-.010	-.001	100	
10	exercise	.121**	.072*	-.028	-.008	.094**	.098**	.074*	.071	.047	100

*p<.05, **p<.01

IV. Discussion

KNHANES is a nationally approved statistical survey on health and nutritional condition conducted according to the law formational health promotion. The raw data used in this study were from the second year of the fourth KNHANES from January to December, 2009. Although the number of adolescents in the original raw data was 854 adolescents consisted of 444 boys and 410 girls. Who answered all of the questions in the questionnaire for adolescents aged 12-18 years and participated in all surveys, in order to increase the reliability of the study results. Out of the total subjects in this study, 31.7% of the boys (271) and 15.3% of the girls (131) were found to perform regular exercise that expended 90mins per week. This findings similar to other studies reporting that male adolescents did more exercise than female adolescents (Kim Y H ,2002-Sanchez A, Norman GJ, 2007) and suggests that research on active participation of girls in exercise and measures to promote their participation are necessary.

The average age of the subjects was 14.6 years, and average height, body weight and BMI were 167.3 cm, 58.8 kg and 20.9kg/m2, respectively in the male adolescents, and 158.8 cm, 52.0kg and 20.5 kg/m2, respectively in the female adolescents. As compared to levels of height, body weight and BMI for boys(164.3 cm, 56.7 kg, and 21.0 kg/m2, respectively) and girls (158.4cm, 51.5 kg and 20.5 kg/m2, respectively) aged 14 years reported by the Ministry of Education and Human Resources Development and the Korean Educational Development Institute (KEDI) the boys' height and body weight were 3.0 cm and 2.1 kg higher, respectively and the girls' height and body weight were recorded as 0.4 cm and 0.5 kg higher, respectively. Interestingly, although the average BMIs of the boys and girls observed in this study were similar to those determined by the Ministry of Education and Human Resources Development and KEDI, the physiques of the subjects in this study, including height and body weight were found to be improved. This study showed that EM recorded significantly higher levels of body weight, waist circumference, and BMI than NEM. In addition, EF had significantly higher levels of height, body weight, waist circumference and BMI than NEF.

Most cross-sectional studies [26,27] have not shown any significant correlations between a regular exercise and variables of metabolic syndrome in children and adolescents. The results indicate that the physiques of adolescents who exercised regularly were better than those of adolescents who did not. However, this is contrary to the results of previous studies revealing that in exercising groups, body weight was significantly lower than in non-exercising groups (Moon SS, Lee YS, 2009). In the third survey, KNHANES investigated physical activity with an International Physical Activity Questionnaire (IPAQ) according to frequency and time of walking, and moderate-intensity and severe-intensity physical activity. This study, which calculated by physical, mental health status with health care utilization, correlated with regular exercise, study revealed there were no significant differences according to exercise in hemoglobin and hematocrit levels or glucose, TC and TG. This is considered to be because the adolescents in all groups of this study were within normal ranges for physical and mental health status at raw data of KNHANES.

V. Conclusion

When the nutrient intakes of all subjects were investigated according to exercise, there were no significant differences between groups, except for higher niacin and potassium intakes of EM compared to NM. Major sources of protein are poultry, wheat bran, tuna and other fish, whereas fresh fruits, vegetables, milk, whole grains, and meats are sources of potassium (Korean Nutrition Society 2006). The rate of boys EM practicing regular exercise was significantly lower than NEM, and the rate of girls EF recommended regular exercise level was significantly higher than NEF. However, this study showed that in both male and female adolescents, correlations between regular exercise with physical, mental health status and health care utilization suggested that efforts to provoke physical development and improvements physical activity by inducing their participation in regular exercise is necessary. Similar to the findings of previous studies reporting that female

students had a high interest in appearance but tended not to practice healthy behaviors in term of physical activity and health behavior (Driskell MM 2008, Sanchez A, Norman, 2007),

According to a study by Lee and Lee [Lee JE, Lee IH. 2006] on mental health and physical status and exercise in underweight and obese adolescents, when adolescents have the habit of enjoying exercise rather than focusing on consuming calories through exercise, obesity can be prevented thus physical training should be a required subject rather than an optional one and class time should be extended to promote and enhance physical strength. This study also indicates that practice of physical education needs to be induced through practice of regular physical activity and exercise in Korean adolescents. In particular exercise programs and nutrient education programs are necessary for girls to help them create habits toward enjoying exercise. This study also found that exercise produced positive effects on physical development. To promote active participation by girls, appropriate recognitions of appearance and health must be made and strategic health education with comprehensive approach strategies including practices of voluntary and healthy exercise and dietary habits should be provided.

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