

A Study of Water Intake Status for Korean Nursing University Students

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Abstract

This study is a descriptive correlation research that aims to inform the importance of water intake, and also to understand the relations of water intake, fatigue, life stress, and BMI of Korean nursing university students. The data was collected for a month from May 1st 2021. Targeting total 229 subjects, the data was analyzed by using the SPSS 23.0 Program. As the statistical methods, this study used the t-test, ANOVA, and correlation. The mean age of subjects was 23. The fatigue, life stress, and BMI related to the general characteristics are as follows. The fatigue showed differences according to the matter of exercise($t=-4.217$, $p<.001$). The life stress showed differences according to the matter of smoking($t=3.110$, $p=.002$) and coffee intake($t=3.404$, $p=.035$). There were differences in BMI according to sex($t=4.719$, $p<.001$), coffee intake($F=3.404$, $p=.035$), and water intake($F=3.397$, $p=.035$). Viewing the water intake, fatigue, and life stress of subjects, the water intake had a significant correlation with BMI($r=0.190$, $p=.004$). The fatigue had a significant correlation with life stress($r=0.348$, $p<.001$). Based on such results of this study, for the great health of nursing students, it would be essential to intake water correctly suitable for weight. Also, even under situations causing the fatigue and stress, the water intake should be recommended instead of coffee intake. In case when educating the water intake, the positive influence of water needs to be emphasized more.

Keywords: Water. Fatigue. Stress. BMI. Student.

1. Introduction

Water is a principal component of human body[1]. About 50-60% of body mass is composed of water, so the water is essential for the maintenance and enhancement of individual health[1],[2]. The lack of fluid intake could seriously threaten human's health[3]. To maintain the proper fluid balance, the European Food Safety Agency(EFSA) recommends the mean-aged women to drink about 2.0 liters of water, and the men to intake about 2.5 liters of water a day[1]. However, there are various opinions about the intake of water, and currently in Korea, it is recommended to drink water in proportion to one's own weight and health status[3].

Currently, there are diverse methods for adults and nursing students to intake fluids, and the consumption of drinks is increasing in the United Kingdom and United States. Still, there are lots of intake of coffee, juice, soft drink, and energy drink[4], so it would be necessary to inform the importance of water intake for adults, and also to increase the water intake for now. Water enables every system of body to function correctly[5].

In other words, the water is essentially needed for the digestive system in charge of digestion

and excretion, the cardiovascular system in charge of blood pressure and cardiac output, the musculoskeletal system in charge of health of muscle and bone, regulation of body temperature, and electrolyte balance[5]. The lack of fluids causes the low metabolism. In this case, the toxins within body are not discharged, so the body could feel a sense of fatigue and stress[6].

According to a preceding research, based on the data of the European Food Safety Agency, the daily fluid intake was 2,550 mL/day[7], and the total daily fluid intake of British adults was 2,270g/day[8]. According to another preceding research, the total daily fluid intake of American adults was 3,180mL/day, and 33% of it was water and 48% of it was drink[9]. In a research targeting Japanese people, the total daily fluid intake of Japanese women in their 18-20 was 1,028g[10].

Currently there is not much domestic data of fluid intake, especially water intake. Calculating the fluid intake by using the data announced by Korean researchers, it is shown as mean 2,414g/day(Men: 2,465 g/day, Women: 2,239 g/day)[11],[12]. This level is similar to the overseas fluid intake. However, when the fluid intake is analyzed in researches, the fluid intake does not mean the intake of water only, but mean various drinks such as coffee, juice, and milk[12].

According to a domestic research, the daily fluid intake was reported as 1,391mL/day of nursing students and 1,281mL/day of general adults, and they were drinking various drinks such as water, alcohol, soft drink, and coffee[12]. Especially, the nursing students' intake rate of coffee and energy drink is continuously increasing[11], [13], so it would be necessary to educate the correct fluid intake, especially water intake. The intake of pure water is a very important element to keep health[14]. And when intaking water, it is important to correctly intake it suitable for one's own weight.

The correlation between BMI and fluid intake needs to be reviewed. A preceding research mentioned the importance of fluid intake suitable for one's own weight[15]. However, so far, there have not been many domestic & foreign researches on the actual status of fluid intake of Korean nursing students. Most of the domestic researches analyzed the intake of water and caffeine drinks[16]. And there were many researches targeting the middle-aged and secondary school students[17],[18]. Most of the researches targeting the 20s, especially nursing students focused on the intake of highly-caffeinated drinks and included a bit of contents related to fluid intake, so there are not many researches concretely handling the actual status of fluid intake[16].

Recently, however, the importance of fluid intake has been rising, so it would be significant to research the actual status of correct fluid intake. Thus, this study aims to research the actual status of fluid intake targeting the 20s that could be the beginning to keep health. This study aims to provide the basic data of relevant educational programs by reverifying the importance of fluid intake.

2. Study Methods

2.1. Study Design

This study is a descriptive research for understanding the actual status of water intake targeting Korean nursing students. This study is a quantitative research. As the number of samples, the minimum sample size was calculated by using the G-Power 3.1.2 Program[19]. The number of samples was

calculated by using the G Power 3.1.9.2 program. Based on the significance level as $\alpha=.05$, test power as $1-\beta=.95$, and effect size as 0.3(medium), the minimum number of subjects required for this study was 139. Considering the dropout rate, total 240 people participated in this study. After excluding 11 questionnaires with insufficient contents, total 229 questionnaires were analyzed. Before data collection, the ethical aspect of subjects was considered.

2.2. Study Tools

Regarding the instrument of this study, the researcher developed, modified, and complemented it based on preceding researches, and two professors of nursing science reviewed the content validity. The instrument was composed of total 72 items including 14 items for the general characteristics, nine items for the characteristics of water intake, one item for the degree of fatigue, and 50 items for the degree of life stress of nursing students. The concrete contents are as follows. The general characteristics were composed of sex, age, school year, height, weight, the number of urination, color of urine, matter of smoking, matter of drinking, matter of exercise, and daily coffee intake.

The general characteristics and the characteristics of water intake were developed by the researcher based on preceding researches. The concrete contents were composed of the matter of knowing the components of water they were drinking, the type of drinks they usually drank, the types of water they usually drank, the reason why not drinking water, the parts regarded as important when drinking water, if they received the education about the importance of water, if they were drinking water suitable for their weight, and the matter of using a portable water bottle. The fatigue was composed of one item on the basis of 10-point Likert Scale(1: Not at all, 10: Very tired).

2.2.1. Life Stress

In order to measure the degree of life stress experienced by nursing students, this study used the 'Revised Life Stress Scale for College Student(RLSS-CS)' developed by Chon et al. [20]. This instrument was composed of total 50 items and eight factors such as interpersonal stress like relationships with friend, lover, family, and professor, and stress from urgent problems like academic problem, economic problem, future problem, and values problem. In the research by Chon et al. [20] who developed the instrument, the frequency of stressful experiences for last year and the importance of event were evaluated on the basis of 4-point scale. However, this study omitted the measurement of importance and then recomposed it only with the frequency of experiences on the basis of 5-point Likert Scale(1: Not at all, 5: Very often).

When the instrument was developed, the Cronbach's α was .75 in the research by Chon et al.[20]. In this study, the Cronbach's α was .95.

Attitude toward tuberculosis refers to tuberculosis prevention education, the importance of treatment, and awareness of tuberculosis. There were 15 items in total, and each item was measured on a Likert scale ranging from 1 point 'Not at all' to 4 points 'strongly agree'(score range 15-60 points). The higher the score, the more positive the attitude toward tuberculosis. In Cha Mi-sook's study [8], the reliability of instrument was Cronbach' α =.83, and in this study, it was Cronbach' α =.94.

2.3. Data Collection and Ethical Considerations

The data collection was performed for a month in May 2021. The data was collected from domestic nursing students enrolled in universities located in Daejeon Metropolitan City, Chungcheongnam-do, and Chungcheongbuk-do. To obey the research ethics, the researcher fully explained the purpose of research and contents of questionnaire to subjects, and then limited the participants in this study to the ones who agreed on the participation in this study.

Using the convenience sampling method, the data collection was performed at random. As the nursing students of each school, the research subjects were included in vulnerable research subjects. Thus, for the protection of research subjects, another joint researcher except for the professor in the same university conducted the research activities like acquisition of consent and data collection. Before starting the research, the approval was obtained from the institutional review board of university A (Approval No. 1044342-20210428-HR-003-02). After the research ended, the data was discarded.

2.4. Data Analysis

The collected data was analyzed by using the IBM PASW Statistics (SPSS) 23.0 program.

- The general characteristics and the characteristics of water intake of subjects were analyzed through frequency and percentage.
- The degree of BMI, fatigue, and life stress of subjects was analyzed through mean and standard deviation.
- The daily water intake, fatigue, life stress, and BMI according to the general characteristics of subjects were analyzed through the t-test and ANOVA.
- The relations of daily water intake, fatigue, life stress, and BMI of subjects were analyzed through the Pearson correlation.

3. Results

3.1. General Characteristics

The general characteristics are as follows. The mean age of subjects was 23.13(\pm 5.88). In sex, the women (85.6%) took up the higher percentage. In case of school year, the fourth-year students were the most (41.0%), the third-year students were 17.5%, the second-year students were 22.3%, and the first-year students were 19.2%. For urine volume, 5-6 times a day were the most (42.4%), 1-2 times were 3.1%, 3-4 times were 35.4%, 7-8 times were 13.1%, and more than 8 times were 14%.

The most responses were shown as no smoking (93.4%) for the matter of smoking, drinking (59.0%) for the matter of drinking, and no exercise (57.6%) for the matter of exercise. For coffee intake, 200-400cc per day were the most (47.6%), non-intake was 39.7%, and 600-1000cc per day were 12.2%. For water intake, 600-1000cc per day were 47.6%, 200-400cc per day were 20.1%, 1200-1800cc per day were 12.0%, and over 2000cc per day were 7.9%. The mean of urine color was 2.71 \pm 0.61; the mean of BMI was 22.1 \pm 3.29; the mean of fatigue was 7.03 \pm 1.96; the mean of life stress was 3.11 \pm 0.60; and the mean of daily water intake was 873 \pm 496.15(cc). The general characteristics are as Table 1.

Table 1. General Characteristics
N=299

Characteristics	Categories	N(%) or M±SD
Age		23.13±5.88
Gender	Male	33(14.4)
	Female	196(85.6)
Grade	Freshman	44(19.2)
	Sophomore	51(22.3)
	Junior	40(17.5)
	Senior	94(41.0)
Urine volume/day(200cc)	1-2	7(3.1)
	3-4	81(35.4)
	5-6	97(42.4)
	7-8	30(13.1)
	≥8	14(6.1)
Smoking	Smoking	15(6.6)
	Non-smoking	214(93.4)
Drinking	Drinking	135(59.0)
	Non-drinking	94(41.0)
Exercise	Do exercise	97(42.4)
	Do not exercise	132(57.6)
Coffee Intake (per day, cc)	Non-Intake	91(39.7)
	200-400cc	109(47.6)
	600-1000cc	28(12.2)
	≥1200cc	1(0.4)

Water Intake (per day, cc)	200-400	46(20.1)
	600-1000	109(47.6)
	1200-1800	20(12.0)
	≥2000cc	18(7.9)
Urine color	Range(1-4)	2.71±0.61
BMI	Range(1-10)	22.1±3.29
Fatigue	Range(0-30)	7.03±1.96
Stress of life	Range(1-5)	3.11±0.60
Intake water (per day, cc)	Range(200-1800)	873±496.15

3.2. Fatigue, Life Stress and Bmi Related to General Characteristics

The fatigue, life stress, and BMI related to the general characteristics are as follows. The fatigue showed differences according to the matter of exercise($t=-4.217, p<.001$). The students who exercised (6.42) feltless tired than those who did not exercise (7.49). The life stress showed differences according to the matter of smoking($t=3.110, p=.002$) and coffee intake($t=3.404, p=.035$).

The students who smoked (2.58) were more stressed out than those who did not smoke (2.08). And the students who drank 600-1000cc of coffee a day (2.38) were more stressed out than those who drank less than 200cc of coffee a day (2.06).

The BMI showed differences according to sex($t=4.719, p<.001$), coffee intake($F=3.404, p=.035$), and water intake($F=3.397, p=.035$). The female students (24.55) had higher BMI than the male students (21.69). The students who drank 600-1000cc of coffee a day (23.46) had higher BMI than those who drank less than 200cc of coffee a day (21.65). The students who drank 200-400cc of water a day (21.07) had lower BMI than those who drank more than 2000cc of water a day (23.51). There were no significant differences in other items. The fatigue, life stress, and BMI related to the general characteristics of subjects are as Table2.

Table 2. Fatigue, Life stress and BMI related to General Characteristics

N=299

Charact eristics	Categories	Fatigue		Life Stress		BMI	
		M±SD	t or F (p)	M±SD	t or F (p)	M±SD	t or F (p)
Gender	Female	7.12±1.93	-1.468 (.143)	2.14±0.61	-1.847 (.066)	24.55±3.1 2	4.719 (<.001)
	Male	6.57±2.10		1.93±0.57		21.69±3.1 4	
Grade	Freshman	6.56±2.25	1.686 (.131)	2.14±0.65	0.047 (.986)	21.78±3.2 1	0.682 (.564)
	Sophomore	7.13±2.02		2.10±0.61		22.58±2.9 0	
	Junior	6.60±2.01		2.13±0.59		21.72±3.5 5	
	Senior	7.30±1.72		2.10±0.60		22.14±3.4 3	
Number of Urine/d ay(times)	1-2	8.71±1.25	1.400 (.235)	2.03±0.58	0.194 (.941)	22.08±2.5 4	0.999 (.409)
	3-4	6.97±1.88		2.16±0.61		22.29±3.9 2	
	5-6	6.97±1.77		2.10±0.58		21.72±2.7 7	
	7-8	7.13±2.01		2.08±0.62		22.14±3.3 7	
	>=8	0.78±3.35		2.07±0.78		23.48±2.6 5	
Smoking	Yes	7.61±2.16	1.281 (.202)	2.58±0.82	3.110 (.002)	21.28±3.6 5	-0.990 (.323)
	No	0.99±1.94		2.08±0.07		22.15±3.2 7	
Drinking	Yes	6.93±1.94	0.6978	2.12±0.57	0.183	22.06±3.2	-0.229

			(.329)		(.855)	9	(.819)
	No	7.19±2.00		2.10±0.65		22.16±3.32	
Exercise	Yes	6.42±2.03	-4.217	2.09±0.64	-0.551	22.25±3.14	0.592
	No	7.49±1.79	(<.001)	2.13±0.57	(.582)	21.99±3.41	(.555)
Coffee Intake/day(cc)	<200	6.98±1.90	0.990 (.373)	2.06±0.55a	3.404 (.035) a<c	21.65±3.28a	3.397 (.035) a<c
	200-400	6.95±2.09		2.10±0.58b		22.11±3.27b	
	600-1000	7.51±1.61		2.38±0.79c		23.46±3.14c	
Water Intake/day(cc)	200-400	7.39±2.12	0.884 (<.450)	2.20±0.57	0.726 (.537)	21.07±2.73a	3.016 (.031) a<d
	600-1000	7.00±1.81		2.06±0.54		22.07±3.51b	
	1200-1800	6.98±1.88		2.15±0.71		22.55±3.66c	
	>=2000	6.55±2.61		2.11±0.71		23.51±3.35d	

3.3. Characteristics of Water Intake

The characteristics of water intake of subjects are as follows. The students who knew to some degree (47.2%) of the ingredients of water were the most, the students who knew the ingredients of water were 16.2%, and the students who didn't know the ingredients of water were 36.7%. The most responses were shown as no(81.7%) for the matter of drinking water suitable for their weight, no(72.9%) for the matter of carrying a portable water bottle.

For the type of drink, water (52.8%) was the most, coffee was 21.4%, and coke was 15.7%. For the type of water, bottled water (69.9%) was the most, boiled water was 24.9%, and mineral water was 4.8%. For the reasons for drinking water, feeling thirsty (62.4%) was the most, habitually was 16.2%, and good for health was 14.4%.

For the reason for not drinking water, no specific reason (44.1%) was the most and not feeling

thirsty was 34.5%. For important things when choosing water, price (48.9%) was the most, tasty was 21.4%, and amount was 10.9%. The students who received water intake education were 38.0% and those who didn't received water intake education were 62.0%.The characteristics of water intake of subjects are as Table3.

Table 3.Characteristics of Water Intake
N=299

Characteristics	Categories	N(%)or M±SD
Whether to know the ingredients of water	I know	37(16.2)
	I know to some degree,	108(47.2)
	I don't know	84(36.7)
Whether to drink water according to the weight	Yes	42(18.3)
	No	187(81.7)
Whether to carry a portable water bottle	Do carry	62(27.1)
	Do not carry	167(72.9)
Types of drinks usually drink	Milk products	7(3.1)
	Coke	36(15.7)
	Juice	4(1.7)
	Isotonic	10(4.4)
	Vitamins drink	2(0.9)
	Coffee	49(21.4)
	Water	121(52.8)
Types of water usually drink	Boiled water	57(24.9)
	Bottled water	160(69.9)
	Mineral water	11(4.8)
	Others	1(0.4)
Reasons for drinking water	Feeling thirsty	143(62.4)

	Good for health	33(14.4)
	Cheap	1(0.4)
	Easy to obtain	1(0.4)
	Habitually	37(16.2)
	For recharge body	7(3.1)
	Others	7(3.1)
Reasons for not drinking water	No specific reason	101(44.1)
	Not feeling the necessity to drink	18(7.9)
	There is no time	14(6.1)
	Not feeling well	2(0.9)
	Not feeling thirsty	79(34.5)
	Preferring other drinks	15(6.6)
Important things when choosing water	Price	112(48.9)
	Amount	25(10.9)
	Ingredients	11(4.8)
	Tasty	48(21.4)
	Brand	20(8.7)
	Others	12(5.2)
Whether to receive water intake education	Yes	87(38.0)
	No	142(62.0)

3.4. Correlation of Water Intake, Fatigue, Life Stress and Bmi

The correlations of water intake, fatigue, life stress, and BMI of subjects are as Table 4. The water intake had a significant correlation with BMI($r=0.190$, $p=.004$). The fatigue had a significant correlation with life stress($r=0.348$, $p<.001$).

Table 4. Correlations of Water Intake, Fatigue, Life stress, and BMI

N=299

	Water intake	BMI	Fatigue	Life Stress
Water intake	1			
BMI	0.190(.004)	1		
Fatigue	-0.103(.119)	-0.067(.315)	1	
Stress of life	-.027(.680)	0.036(.590)	0.348(<.001)	1

4. Discussion

This study was performed to research the actual status of fluid intake of Korean nursing students, to suggest the importance of fluid intake, and also to create the basic data for the development of relevant educational programs. In the general characteristics, the mean age of subjects was 23.13(±5.88). In sex, there were more women.

The most responses were shown as no smoking(59%) for the matter of smoking. Drinking(59%) for the matter of drinking, and no exercise(57.6%) for the matter of exercise. This result is the same as the results of a preceding research showing many students who were drinking without smoking and exercising[15]. In the number of urination a day, 5-6 times was the most.

In a preceding research, the Korean nursing students considered the price and quantity first without checking the nutrients when purchasing water, which accorded with the result of this study[15]. Despite the importance of drinking good water, the nursing students' choice was not like that. In the results of this study, the students who didn't know the components of water were 36.7%, and the students who did not drink water suitable for their weight were 81.7%. Also, in the results of this study, total 62% of students did not receive the education about water intake, so it would be necessary to provide them with the education about how to select/intake water.

In the types of drinks, the subjects of this study drank water(52.8%) and other drinks. As the drinks they were intaking, they drank lots of coffee and soft drinks. Even in a preceding research, the university students drank lots of coffee and soft drinks[16].

Drinking coffee and sugared drinks is not a habit great for health, which needs to be corrected[21]. The subjects of this study were drinking about 200-400cc of coffee a day. Considering that some university students in a region of Korea were drinking average 156-157ml of coffee, the university students of this study were drinking lots of highly-caffeinated drinks, especially coffee[16].

Such highly-caffeinated drinks could cause many side effects such as insomnia, palpitation, headache, and dizziness[17]. Thus, in order to keep the great health, there should be the education for the correct intake of pure water. A preceding research studied the dehydration to mention the importance of water intake[22].

In the research, the knowledge about the definition, symptoms, causes, and prevention of dehydration, and a habit of water intake was evaluated, and the participants were knowing about the symptoms of dehydration and drinking average five glasses or more of water a day[22]. In this study, most of the university students were drinking about 3-5 glasses of water a day, which was similar to the preceding research.

Most of the subjects of this study drank water because they felt thirsty. The subjects who drank water to be helpful for health were 14.4%, so it would be necessary to increase the water intake by accurately informing the relation between water intake and health in the future.

In differences of fatigue, life stress, and BMI related to the general characteristics of subjects, the fatigue showed differences according to the matter of exercise($t=-4.217$, $p<.001$). The students who did not exercise showed the higher fatigue than the students who did exercise. Also, in a preceding research, the exercise lowered the fatigue, which showed the similar result to the result of this study[23].

The life stress showed differences according to the matter of smoking($t=3.110$, $p=.002$) and coffee intake($t=3.404$, $p=.035$). In a preceding research using the same instrument, the mean score of life stress of university students was 2.36, which was lower than the stress index(3.11) of nursing students in this study. Also, the students who were smoking showed the higher life stress than the students who did not smoke while the students with lots of coffee intake showed the high life stress[24].

In a preceding research, there were differences in life stress according to smoking while there were no significant differences in life stress according to coffee intake[23]. This part showed the result different from this study, so there should be repetitive researches afterwards. Also, in this study, the fatigue and life stress showed a significant correlation. Many university students preferred coffee in fatigue and stressful situations[25]. However, the caffeine could disturb a sleep at night, which could be led to a vicious circle[25].

It would be needed to educate the intake of pure water for health even in fatigue and stressful situations. In this study, there were differences in BMI according to coffee intake and water intake. Also, in a preceding research, there were differences in obesity between a group of people drinking coffee and a group of people without drinking coffee, which showed the similar result to this study[15]As one of the drinks loved by adults, the coffee could cause such problems like obesity[18], so the correct water intake should be recommended more than coffee intake. Lastly, the water intake had a significant correlation with BMI, and the fatigue had a significant correlation with life stress.

In a preceding research verifying the body composition and coffee targeting the female university students, the coffee intake had significant effects on body composition, and the body composition figure related to obesity was actually increased. Also, there were differences in water intake and body composition. In the results of a preceding research, the coffee could cause the obesity, and the minimum five or more glasses of water should be taken each day to maintain the body composition related to health[15].

Also, in another preceding research[22], the weight status was shown as a predictive factor of water intake. Actually, in this study, there were differences in BMI according to water intake. This could be used as the grounds supporting the results of this study. The further researches may need to verify the factors affecting the water intake in the future.

5. Conclusion

This study understood the actual status of water intake targeting Korean nursing students, and also verified the correlations of water intake, fatigue, life stress, and BMI.

This study is a descriptive research aiming to provide the basic data to seek for the measures for positively changing the habit of fluid intake of subjects. In the results of this study, there were significant correlations between water intake and BMI, and between fatigue and life stress of subjects. And the life stress showed differences according to the matter of smoking and coffee intake.

If they intake pure water instead of caffeine drinks in fatigue or stressful situations, it could be more helpful for fatigue or stress. Therefore, it would be necessary to present the educational measures for water intake in order to positively change their attitude in the future. In the water intake, fatigue, and life stress of subjects, the water intake had a significant correlation with BMI.

The fatigue had a significant correlation with life stress. In case when feeling fatigue and stresses, it would be needed to intake pure water suitable for one's own weight, rather than intaking caffeine or high-sugar drinks. Based on such results of this study, the correct water intake is essential for the health of nursing students.

Also, in case when educating the water intake, it would be necessary to emphasize the positive influence of water more. Considering such results of this study, it would be required to provide the education of water intake to nursing students, and in case when educating the water intake, the positive influence of water should be emphasized more. Moreover, the national health education would need to educate the water intake targeting the adults.

This study could establish the basic data for the development of efficient nursing intervention in the attitude toward water intake for maintaining the physical/psychological health of domestic nursing students, and also changing the perception of water intake that could cause health problems in the long term. And this study suggests a research for the development of relevant intervention program.

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