

# The Influence on Medication Adherence of the Elderly with Chronic Diseases in Rural Area

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**Abstract:** *Background/Objectives: The purpose of this study was to investigate the effects of Health Literacy, Social-Support, and Self-Efficacy on Medication Adherence of the Elderly with Chronic Diseases in Rural. Methods/Statistical analysis: The subjects were 239 elderly people aged 65 years or older who wanted to attend two small hospitals in J do H, and data collection was conducted from July 14, 2017 to August 14, 2017 using structured questionnaires one on one interviews were conducted. The instruments of the research included the Korean Functional Health Literacy Test(KHLT), Social-Support is used MPSS(The Multidimensional Scale of Social-Support) and Self-Efficacy Scale, Medication Adherence is used Medication Adherence Scale(MMAS-8).The data were analyzed using SPSS/WIN 23.0, as Correlation among Health Literacy, Social-Support, Self-Efficacy and medication in Adherence of objects, Pearson's correlation coefficient was used. Factors Affecting Medication adherence of the Elderly with Chronic Diseases were analyzed with Multiple regression. Findings: The results of the study were as follows. The higher the level self-efficacy, the higher the health literacy( $r=.80$ ,  $p < .001$ ). The higher the level self-efficacy, the higher the level of social-support( $r=.77$ ,  $p < .001$ ). The factors influencing medication adherence are daily frequency of medication( $p=.005$ ), and self-efficacy ( $p=.010$ ). The explanation is that medication adherence is total 22.9%( $F=8.56$ ,  $p<.001$ ). Improvements/ Applications: In conclusion, this study showed that medication adherence had a positive correlation among health literacy, self-efficacy, and social and social-support. Thus this suggests that in order to enhance medication adherence of the elderly with chronic diseases in rural Area, programs which up step self-efficacy have to be provided first of all.*

**Keywords:** *Chronic disease elderly, Health literacy, Social-support, Self-efficacy, Medication adherence.*

## I. INTRODUCTION

In Korea, 89.2% of elderly population over 65 years old has a chronic disease and 46.2% have three or more chronic diseases [1]. The observation of proper lifestyle and correct medication adherence over a long period of time are very important for the management of a chronic disease [2], however, the investigation result showed that more than 50.2% of target patients with a chronic disease do not take medication [3]. Especially, the chronic disease prevalence in rural areas is higher than that in urban areas, and the average disease period in rural areas (10.8 days) is longer than that in urban areas (8.7 days) [1] and the non-compliance of taking medicine is higher in rural areas [4]. Therefore, it is important

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to determine relevant factors in order to improve the medication adherence of elderly with a chronic disease in vulnerable areas such as a rural area.

In order for target patients with a chronic disease to manage their disease effectively, proper health literacy to understand and manage their disease well is necessary in the first place [5]. Due to the characteristics of a chronic disease, it requires lifetime management, and a person who lacks health literacy cannot implement medical directions well [6]. The health literacy is a very important factor to elderly with a chronic disease who need to maintain correct medication adherence, and in consideration of situations in rural areas showing high chronic disease prevalence and frequent intake of multiple drugs, it is highly necessary to determine the health literacy of elderly with a chronic disease.

In case of elderly with a chronic disease, physical functions are lowered and has a lack of economic power, so the ability to deal with various problems is very weak and one often faces a difficulty in solving a problem by oneself, so various proper supports may significantly influence the quality of life in old stage. Therefore, the elderly with a chronic disease in rural areas need help from their family or others, but 58.3% of the family form of a elderly in a local community is a household consisting of a couple or a elderly living alone [7] and the number of elderly living alone is expected to increase continuously, therefore, they cannot fully depend on their family for helping elderly with a chronic disease to understand health information. Thus, it is necessary to prepare resources for dealing with various difficulties in the old stage and determine various forms of social support that can be used in order for elderly with a chronic disease in rural areas to implement medication adherence well.

The medication time, dosage, number of medications and observation of directions are very important for elderly with a chronic disease to take medications continuously [8], and the self-efficacy is an important factor that helps elderly with a chronic disease to implement the treatment directions related to medication adherence and improving health results [9,10]. It was also proved that self-efficacy had the highest influence with regard to health behavior among the factors influencing the self-management of elderly with a chronic disease [11, 12]. The ageing population and the number of elderly living alone are increasing rapidly in rural communities, emphasizing the importance of self-management for elderly with a chronic disease in rural areas. Studies on factors improving the self-management are being carried out,



but there is a lack of study on self-efficacy and social support regarding medication adherence. If the self-efficacy of elderly with a chronic disease whose physical ability for daily activity has declined is improved, a motive to carry out basic self-preservation activities continuously will be provided, influencing positive health behavior and improving medication adherence. Therefore, in order to improve the medication adherence of elderly with a chronic disease who take multiple drugs frequently, it would be significant to determine the degree of and correlation between social support and self-efficacy that can help improving the health literacy and confirm its influence. Therefore, this study is intended to investigate the degree of health literacy, social support, self-efficacy and medication adherence targeting elderly with a chronic disease living in rural areas and determine the factors influencing their medication adherence. In addition, this study intended to determine a difference in the medication adherence according to the characteristics of elderly with a chronic disease in rural areas and the relationship between their health literacy, social support, self-efficacy and medication adherence so that the results of this study can be utilized to provide customized medical information in consideration of the levels of elderly with a chronic disease in rural areas in future and as a basic data necessary for developing a measure to utilize the resource of extensive social support and a self-efficacy improvement program for health behavior according to an increase in the number of elderly living alone.

## II. METHODS

### 2.1. Study Participants

In this study, a convenient sampling method was used for elderly over 65 years old who were diagnosed with a chronic disease (hypertension, diabetes, arthritis, heart disease, kidney disease, cerebrovascular disease) from a small and medium sized hospitals located in H-gun, J province and visited an outpatient department for a follow-up management. For the sample size of this study, 230 elderly were required based on the regression analysis with 8 predictor variables for random estimation, .95 for power, .05 for significance level, and .15 for effect size using G\* power 3.1, however, in consideration of a 10% dropout rate, the survey was carried out for 245 elderly, and 239 copies of questionnaire except for 6 copies with undependable responses from the recovered questionnaires were analyzed.

### 2.2. Research tool

#### 2.2.1. General characteristics and medication characteristics

The general characteristics of elderly included age, gender, marital status, occupation, education level, monthly income, living situations, subjective health condition, daily living ability, and possessed disease. The medication characteristics included current medication, number of medications per day, number of dosage per day, someone who could help taking medication and experience of adverse drug effects and it consisted of 15 questions.

#### 2.2.2. Health literacy

For the health literacy, the Korean Functional Health Literacy Test (KFHLT) developed by KIM and Lee [13] and

modified and supplemented by Park [14] was used. It consists of 15 questions, and 1 point for a correct answer and 0 point for an incorrect answer are given. The total score is 0-15 points, and a higher score means the health literacy function which is an ability to read, understand health-related information in real life and behave accordingly is good. The reliability of the tool at the time of its development was Cronbach's  $\alpha=.83$  and .73 for mathematics section and .78 for reading section which were the sub areas. The reliability of the tool modified and supplemented by Park [14] was Cronbach's  $\alpha=.79$ , .63 for mathematics section and .78 for reading section, and the reliability of this study was Cronbach's  $\alpha=.86$ , .87 for mathematics section and .86 for reading section.

#### 2.2.3. Social- support

For the social support, MSPSS (The Multidimensional Scale of Perceived Social Support) developed by Zimet et al [15] and adapted by Sin and Lee [16] was used. MSPSS consists of 12 questions including 5 questions about support from one's family, 4 questions about support from a friend and 4 questions about support from others. The 7-point Likert scale was used from 1 point for 'disagree,' 3 points for 'moderate' to 7 points for 'agree,' and the total score is 12-84 points, and a higher score indicates higher level of social support. The reliability of the tool at the time of its development was Cronbach's  $\alpha=.89$  and the reliability of this study was Cronbach's  $\alpha=.98$ .

#### 2.2.4. Self-efficacy

For the self-efficacy, general self-efficacy scale among the self-efficacy scale developed by Sherer and Maddux [17] which was translated by Oh Hyun-soo [18] was used. The self-efficacy scale consisted of 17 questions including 2 questions for 'beginning of behavior,' 6 questions for 'effort,' 5 questions for 'will to continue regardless of a difficulty,' 2 questions for 'achievement' and 2 questions for 'conviction.' This tool is the 5-point scale from 5 points for 'Strongly agree' to 1 point for 'Strongly disagree' for a positive question according to the level of agreement and applying points inversely for a negative question, and the total score is 17-85 points and a higher score means higher degree of self-efficacy. The reliability of the tool at the time of its development was Cronbach's  $\alpha=.80$  and the reliability of the tool in this study was Cronbach's  $\alpha=.88$ .

#### 2.2.5. Medication adherence

The medication adherence was measured using the Morisky Medication Adherence Scale (MMAS-8) developed by Morisky, Krousel-Wood and Ward [19] and modified and supplemented by Min and Kim [20]. It consisted of 8 questions, and 0 point for 'yes' and 1 point for 'No' were given from questions 1 to 7 except for question 5, and the point was applied inversely for question 5. For question 8, 1 point for '0=few,' 0.75 point for '1=a few,' 0.5 point for '2=sometimes,' 0.25 point for '3=frequently,' and 0 point for '4=always' are given with 8 points as the total score. The score below 6 points indicates low medication adherence, the score between 6-8 points indicates moderate medication adherence

and 8 points indicate high medication adherence. The reliability of the tool at the time of its development was Cronbach's  $\alpha=.83$  and the reliability of this study was Cronbach's  $\alpha=.73$ .

**2.3. Data collection**

This study was approved by the Institutional Review Board of N University located in G city (10414782017-H R-004) and data was collected from elderly who received outpatient treatment from two small and medium sized hospitals located in H-gun, J-do for a chronic disease from July 14, 2017 to August 14, 2017. After an explanation of the purpose of study was given to elderly and their consent was obtained, one-to-one interview using the structured questionnaire was conducted. The time taken for the survey was 30~40 minutes on average, and the prepared questionnaires were collected in a sealed return envelope by the researcher and research assistant and a present was given in acknowledgement of participation in the study.

**2.4. Data analysis**

The SPSS WIN 23.0 program was used for the collected data, and the real number, percentage, mean and standard deviation for the characteristics of elderly were calculated. The mean, standard deviation and range were calculated in order to determine the degree of health literacy, social support, self-efficacy and medication adherence of target elderly. A difference in the health literacy, social support, self-efficacy and medication adherence according to the characteristics of elderly were analyzed using t-test and ANOVA and the post-hoc test was analyzed using Scheffe. The relationship between the health literacy, social support, self-efficacy and medication adherence of elderly was analyzed with Pearson's correlations and the factors affecting the medication adherence were analyzed with the multiple regression.

**III. RESULTS**

**3.1. General characteristics and medication characteristics of elderly with chronic diseases**

The general characteristics and medication characteristics of elderly are as shown in Table [1]. The total number of elderly was 239 including 68.6% female and 31.4% male. The average age was  $76.40\pm 5.87$ , and for the marital status, 61.99% had a spouse, for the education level, 31.4% answered elementary graduate as the highest, 60.3% answered 'unemployed' as the highest, and for the monthly income, 37.2% answered monthly income more than 1 million KRW and below 2 million KRW as the highest. For the living type, 58.6% answered that they live with a spouse as the highest, and for the subjective health status, 39.4% answered 'Average' as the highest. For the degree of activities of daily living, 42.7% answered that they were able to do by themselves as the highest. For the chronic disease prevalence, 93.7% answered arthritis as the highest, followed by 56.5% for hypertension, 21.8% for diabetes, 16.3% for kidney disease, 11.3% for heart disease, and 8.4% for cerebrovascular disease in the order. For the drugs most frequently taken by the target elderly, 91.3% responded muscular skeletal drugs, and 51% answered that they had someone who could help taking medication, and 72.8% answered that they experienced adverse drug effect. The number of medications per day was 2.10 times on average and the number of dosage per day was 9.12.

**3. 2. Degree of health literacy, social-support, self-efficacy, and medication adherence**

**Table1:General Characteristics and Drug Taking Characteristics of the Elderly with Chronic Diseases (N=239)**

Variables	Categories	n	%	M±SD
Gender	Man	75	31.4	
	Women	164	68.6	
Age(years)	≥69	29	12.1	76.40±5.87
	70-79	140	58.6	
	≥80	70	29.3	
marital status	Have a Spouse	148	61.9	
	Have no Spouse	91	38.1	
Education level	illiteracy	71	29.7	
	Elementary School	75	31.4	
	Middle School	64	26.8	
	≥ high School	29	12.1	
Occupation status	Yes	95	39.7	
	No	144	60.3	
Monthly income(10,000won)	> 50	43	18.0	
	50-100	70	29.3	
	100-200	89	37.2	
	> 200	37	15.5	
living type	Alone	78	32.6	
	spouse	140	58.6	
	offspring	17	7.1	
	spouse, offspring	4	1.7	

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Subjective health status	Very Good	2	0.8	
	Good	42	17.6	
	Usually	94	39.4	
	bad	88	36.8	
	Very bad	13	5.4	
ADL(activities of daily living)	Independent	102	42.7	
	Some help	96	40.2	
	Dependent	41	17.2	
Diagnosed disease†	Arthritis	224	93.7	
	Hypertension	135	56.5	
	Diabetes	52	21.8	
	Renal disease	39	16.3	
	Cardiovascular	27	11.3	
Taking any medication†	Cerebrovascular drugs	2	8.4	
	Cardiovascular drugs	194	81.2	
	Endocrine drugs	53	22.2	
	Musculoskeletal drugs	218	91.2	
	Other drugs	116	48.5	
Someone who could help taking medication	Yes	122	51.0	
	No	117	46.0	
Adverse drug effect	Yes	174	72.8	
	No	65	27.2	
Number of medications per day	1	16	6.7	2.10±.48
	2	182	76.2	
	3	41	17.2	
Number of dosage per day	≥6	46	19.2	9.12±2.71
	7-9	73	30.5	
	10-11	64	26.4	
	12-16	57	23.8	

†Overlapping response

The result regarding the degree of health literacy, social-support, self-efficacy and medication adherence of the elderly is as shown in Table [2]. For the average score, health literacy was 10.72±4.30 points and social -support was 56.60 points which was 4.72±1.19 points based on the 7-point scale, and family support was 5.3±1.26 points, support from others was 4.59±1.24 points and support from friend was 4.53±1.21

points which were the sub areas. The self-efficacy was 54.06 points which was 3.18±0.71 points on the 5-point scale, and medication adherence was 5.81±1.88 points with 2.5 points for the lowest score and 8 points for the highest score. Based on the 6-point scale, the group with low medication adherence was 41%, the group with moderate medication adherence was 47%, and the group with high medication adherence was 10%.

**Table2:Degrees of Health Literacy, Social-Support, Self-Efficacy, Medication Adherence of the Elderly with chronic Diseases (N=239)**

Variables	Categories	M±SD	Range	n(%)
Health literacy		10.72±4.30	0-15	
	Comprehension	5.23±2.53	0-8	
Social-support	Reading	5.49±2.07	0-7	
		4.72±1.19	1-7	
	Family	5.03±1.26	1-7	
	Friend	4.53±1.21	1-7	
	Other	4.59±1.24	1-7	
Self-efficacy		3.18±0.71	1-5	
	Behavior	3.04±1.03	1-5	
	effort	3.10±1.00	1-5	
	Lasting will	3.01±0.25	1-5	
	Accomplishment	3.20±0.79	1-5	
	Conviction	3.53±0.85	1-5	
Medication adherence Level *		5.81±1.88	0-8	
	Low		0.00-5.99	98(41%)
	Middle		6.00-7.99	117(49%)

\* **Based on the 6-point scale:** Less than 6 points-low medication adherence, 6 or more- moderate medication adherence, 8 point- high medication adherence

**3.3. A difference in the health literacy, social- support, self-efficacy, and medication adherence according to general characteristics and medication characteristics**

The analysis results of a difference in the health literacy, social-support, self-efficacy, and medication adherence according to general characteristics and medication characteristics of elderly are as shown in Table [3]. There was a statistically significant difference in the health literacy according to gender ( $t=5.25, p=.001$ ), age ( $F=82.24, p=.002$ ), marital status ( $t=10.95, p=.014$ ), education level ( $F=70.28, p=.001$ ), occupation status ( $t=-14.50, p=0.006$ ), monthly income ( $F=79.48, p=.005$ ), living type ( $F=44.73, p=.006$ ), subjective health status ( $F=50.62, p=.008$ ), activities of daily living ( $F=123.5, p=.007$ ), someone who could help taking medication ( $t=8.40, p=.001$ ), number of medications per day ( $F=5.30, p=.006$ ) and number of dosage per day ( $F=10.52, p=.001$ ). There was a statistically significant difference in the social-support according to gender ( $t=3.42, p=.017$ ), age ( $F=75.23, p=.012$ ), marital status ( $t=0.86, p=.001$ ), education level ( $F=74.17, p=.020$ ), occupation status ( $t=-13.82, p=.001$ ), monthly income ( $F=54.95, p=.008$ ) living type ( $F=46.41, p=.002$ ), subjective health status ( $F=43.01, p=.001$ ), activities of daily living ( $F=98.56, p=.014$ ), someone who could help taking medication ( $t=10.02, p=.001$ ), number of medications per day ( $F=6.24, p=.002$ ) and number of dosage per day ( $F=12.58, p=.001$ ). There was a statistically significant difference in the self-efficacy according to gender ( $t=4.36, p=.007$ ), age ( $F=98.48, p=.001$ ), marital status ( $t=11.45, p=.006$ ), education level ( $F=79.10, p=.005$ ), occupation status ( $t=-15.65, p=.004$ ), monthly income ( $F=41.50, p=.001$ ), living type ( $F=42.58, p=.010$ ), subjective health status ( $F=157.10, p=.006$ ), activities of daily living ( $F=119.7, p=.004$ ), someone who could help taking medication ( $t=7.86, p=.001$ ), number of medications per day ( $F=11.15, p=.001$ ) and number of dosage per day ( $F=.41, p=.001$ ). There was a statistically significant difference in the medication adherence according to age ( $F=113.60, p=.001$ ), monthly income ( $F=12.89, p=.006$ ), subjective health status ( $F=20.23, p=.001$ ), activities of daily living ( $F=7.10, p=.001$ ) and number of medications per day ( $F=10.00, p=.001$ ). The Scheffe test results of influential factors showing a significant difference in the medication adherence are as follows. For the age, the age between 70-79 showed  $6.08 \pm 1.23$  points for the average medication adherence as the highest, followed by the age of 65-69 showing  $5.98 \pm 1.04$  points and the age of 80 and

over showing  $5.19 \pm 1.45$  points in the order. For the subjective health status, the response of ‘very good’ showed  $6.42 \pm 1.07$  points on average as the highest, and for the activities of daily living, the elderly who answered ‘I can manage it by myself’ showed  $6.20 \pm 1.04$  points on average as the highest, followed by the elderly who answered ‘I need some assistance’ showing  $5.74 \pm 1.47$  points on average and the elderly who answered ‘I cannot do it by myself’ showing  $5.01 \pm 1.32$  points on average in the order. For the number of medications per day, one time showed  $6.00 \pm 1.29$  points on average as the highest, followed by two times showing  $5.72 \pm 1.24$  points on average and three times showing  $5.01 \pm 1.24$  points on average in the order.

**3.4. Relationship between health literacy, social-support, self-efficacy, and medication adherence**

The analysis results of correlation between health literacy, social- support, self-efficacy, and medication adherence of elderly are as shown in Table [4]. The medication adherence showed a significantly positive correlation with self-efficacy ( $r=.449, p<.001$ ), health literacy ( $r=.424, p<.001$ ) and social-support ( $r=.379, p<.001$ ). The medication adherence was better as the elderly showed higher self-efficacy, higher social-support and higher health literacy. Especially, the self-efficacy showed a strong positive correlation with health literacy ( $r=.795, p<.001$ ) and social-support ( $r=.768, p<.001$ ).

**3.5. Factors influencing medication adherence**

The regression analysis results of factors influencing the medication adherence of elderly are as shown in Table [5]. In order to determine factors influencing the medication adherence, the regression analysis was carried out with age ( $F=11.60, p=.001$ ), monthly income ( $F=12.89, p=.006$ ), subjective health status ( $F=20.23, p=.001$ ), activities of daily living ( $F=7.10, p=.001$ ), number of medications per day ( $F=10.00, p=.001$ ), health literacy, social- support and self-efficacy showing a significant difference in the medication adherence as independent variables. Other variables had no significant influence on the medication adherence, and the medication adherence was lower as the number of medications per day was greater ( $\beta=-0.18, p=.005$ ), and the medication adherence was higher as the self-efficacy was higher ( $\beta=0.29, p=.010$ ). The factors influencing the medication adherence of elderly included the number of medications per day and self-efficacy that accounted for 22.9% of medication adherence of elderly ( $F=8.56, p<.001$ ).

**Table3: Differences in Health Literacy, Social- Support, Self- Efficacy, and Medication Adherence according to General Characteristics & Drug Taking Characteristics (N=239)**

Variables	Categories	Health literacy			Social -Support			Self -Efficacy			Medication Adherence		
		M±SD	t/F	p	M±SD	t/F	p	M±SD	t/F	p	M±SD	t/F	p
Gender	Man	12.63±3.51	5.25	.001	5.10±1.15	3.42	.017	3.46±0.63	4.36	.007	6.00±1.27	2.12	.053
	Women	9.85±4.35			4.54±1.18			3.05±0.70			5.77±1.65		
Age	65-69 <sup>a</sup>	14.69±0.60	82.24	.002	6.04±0.58	75.23	.012	3.82±0.27	98.48	.001	5.98±1.04	11.60	.001



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(years)	70-79 <sup>b</sup>	11.92±3.58	a>b	4.95±1.03	a>b	3.34±0.57	a>b	6.08±1.23	c<a
	>80 <sup>c</sup>	6.67±3.41	>c	3.69±0.86	>c	2.46±0.51	>c	5.19±1.45	<b
marital status	Have a Spouse	12.67±3.43	10.95 .014	5.28±0.96	0.86 .001	3.51±0.56	11.45 .006	5.96±1.26	2.10 .057
	Have no Spouse	7.55±3.63		3.81±0.95		2.64±0.59		5.57±1.42	
Education level	Illiteracy <sup>a</sup>	6.62±3.04	70.28 .001	3.65±0.90	74.17 .020	2.46±0.49	79.10 .005	5.41±1.41	5.00 .052
	Elementary School <sup>b</sup>	10.83±3.82	a<b	4.60±0.84	a<b	3.26±0.62	a<b,	5.78±1.25	a<b
	Middle School <sup>c</sup>	13.42±2.89	c<d	5.47±0.94	c<d	3.57±0.43	c>d	5.98±1.34	2.10 c<d
	≥high School <sup>d</sup>	14.52±1.53		5.98±0.59		2.78±0.63		6.47±1.05	
Occupation status	Yes	14.07±2.06	-14.50 .006	5.65±0.74	-13.82 .001	3.75±0.32	-15.65 .004	6.26±1.03	-2.31 .060
	No	8.43±3.91		4.08±1.01		2.78±0.63		5.51±1.44	
Monthly income (10,000)	>50 <sup>a</sup>	6.02±3.29	79.48 .005	3.67±1.05	54.95 .008	2.56±0.61	41.50 .001	5.01±1.45	12.89 .006
	50-100 <sup>b</sup>	8.70±3.47	a<b	4.12±0.96	a,b<	2.79±0.58	a,b<	5.50±1.49	a,b
	<100-200 <sup>c</sup>	13.06±2.96	<c,d	5.24±0.85	c,d	3.54±0.55	c,d	6.23±1.00	d<c
	>200 <sup>d</sup>	14.38±1.90		5.81±0.84		3.73±0.35		6.32±1.00	
Living type	Alone <sup>a</sup>	7.58±3.50	44.73 .006	3.71±0.87	46.41 .002	2.66±0.61	42.58 .010	5.58±1.43	2.17 .090
	Spouse <sup>b</sup>	12.89±3.23	a,c,	5.30±0.93	a<b,	3.53±0.54	a,c	6.02±1.19	d>b
	Offspring <sup>c</sup>	7.82±4.64	d<b	4.52±1.28	c,d	2.69±0.64	d<b	5.06±1.64	a>c
	Spouse,Offspring <sup>d</sup>	8.25±4.65		4.88±1.78		3.12±0.82		6.13±1.62	
Subjective health status	Very Good <sup>a</sup>	8.50±9.19	50.62 .008	4.75±2.48	43.01 .001	2.63±0.76	57.10 .006	6.42±1.07	20.23 .001
	Good <sup>b</sup>	14.41±1.80	a,d,e<	5.93±0.63	a,d,e	3.83±0.22	a,d,e	6.21±1.05	a,b
	Usually <sup>c</sup>	12.67±3.40	c<b	5.07±0.95	<c<b	3.49±0.56	<c<b	6.15±1.17	>c,d
	Bad <sup>d</sup>	7.42±3.32		3.90±0.91		2.64±0.56		5.23±1.37	
	Very bad <sup>e</sup>	7.39±2.96		3.79±0.16		2.48±0.38		5.10±1.42	
A D L *	Independent <sup>a</sup>	13.99±2.50	123.5 .007	5.60±0.70	98.56 .014	3.71±0.35	119.7 .004	6.20±1.04	7.10 .001
	Some help <sup>b</sup>	9.33±3.54	a>b	4.29±1.01	a>b>	2.94±0.64	a<b	5.74±1.47	a<b,
	Dependent <sup>c</sup>	5.85±2.87	>c	3.53±0.98	c	2.39±0.46	<c	5.01±1.32	c
Someone who could help medication	Yes	12.74±3.40	8.40 .001	5.36±0.91	10.02 .001	3.49±0.60	7.86 .001	5.98±1.25	2.00 .051
Adverse drug effects	No	8.62±4.14		4.05±1.09		2.85±0.67		5.64±1.41	
	Yes	10.64±4.14	-0.48 .632	4.62±1.15	-2.16 .052	3.13±0.71	-1.66 .097	5.77±1.33	-76 .444
Number of medications per day	1 <sup>a</sup>	10.13±5.37	5.30 .006	5.04±1.53	6.24 .002	2.95±0.77	11.15 .001	6.00±1.29	10.00 .001
	2 <sup>b</sup>	11.19±4.20	c<a	4.82±1.15	a>b,	3.29±0.68	b>a,c	5.72±1.24	a>b,c
	3 <sup>c</sup>	8.85±3.84	<b	4.14±1.09	c	2.76±0.63		5.01±1.24	
Number of dosage per day	>6 <sup>a</sup>	11.59±4.82	10.52 .001	5.20±1.37	12.58 .001	3.35±0.74	21.41 .001	5.87±1.40	2.40 .068
	7-9 <sup>b</sup>	12.18±3.82	d<c	5.10±1.03	a,b>	3.52±0.56	d<a,	6.08±1.17	b>a,
	10-11 <sup>c</sup>	10.57±3.87	a<b	4.50±1.07	c,d	3.11±0.63	c<b	5.79±1.38	c>d
	12-16 <sup>d</sup>	8.32±3.90		4.09±1.03		2.66±0.64		5.45±1.38	

\* A D L; activities of daily living, Scheffe (a,b,c,d,)

**Table 4: Correlation among Health Literacy, Social-Support, Self-Efficacy, and Medication Adherence of the Elderly with Chronic Diseases (N=239)**

Variable	Health literacy r(p)	Social-Support r(p)	Self-Efficacy r(p)	Medication Adherence r(p)
Health literacy	1			
Social-support	.732**	1		
Self-efficacy	.795**	.768**	1	
Medication adherence	.424**	.379**	.449**	1

\*\* p<.001

**Table 5: Factors Affecting Medication Adherence of the Elderly with Chronic Diseases (N=239)**

Variables	B	SE	β	t	p	Tolerance	VIF	R <sup>2</sup>	F(p)	
Age(years)	0.02	0.02	0.09	1.09	.276	0.458	2.185			
Monthly income	-0.34	0.24	-0.10	-1.44	.152	0.727	1.376			
Subjective health status	-1.14	0.87	-0.08	-1.32	.190	0.959	1.043			
Activities of daily living	-0.39	0.23	-0.15	-1.73	.086	0.474	2.111	0.229	8.56(.001)	
Number of medications per day	-0.49	0.17	-0.18	-2.87	.005	0.903	1.108			
Self-Efficacy	0.55	0.21	0.29	2.61	.010	0.266	3.764			
Health Literacy	0.06	0.03	0.20	1.80	.074	0.273	3.664			
Social-Support	0.07	0.11	0.06	0.60	.549	0.331	3.021			
Adj R <sup>2</sup> =	.203	Durbin-Watson=1.78								

#### IV. DISCUSSION

This study is a descriptive correlation study in order to determine the degree of health literacy, social -support, self-efficacy, and medication adherence of elderly with a chronic disease in rural areas and the factors influencing their medication adherence. The average health literacy in this study was 10.72 points which was higher than 5.48 points shown in the study conducted by Kim and Lee [13] and 6.66 points shown in the study conducted by Park [14] elderly in rural areas. The precedent studies reported that the health literacy of elderly was closely related with their general literacy [21], and their literacy was lower as their education level was lower, they were older, as they resided in rural rather than a large city, and as they engaged in farming or fishing [22]. However, the literacy is not necessarily proportional to the education level since the investigation results of illiteracy of adults in Korea showed that 79.7% who answered illiteracy had no reading and writing abilities, indicating that the rest 20% had a certain level of reading and writing abilities. The health literacy was somewhat higher in this study even though the elderly in this study are aged elderly in rural areas and their education level was low because of a difference in the investigation method to read the questionnaire and ghostwrite the responses by considering the mediating factors of various influences on their health literacy and physical characteristics. In addition, the elderly who had a spouse showed high health literacy because they could receive help from their spouse, and the health literacy was higher as their monthly income was higher and their subjective health status was better, supporting the study conducted by Park [14]. Therefore, the consideration of education level and centralized management of elderly with a chronic disease showing poor subjective health status and falling under low-income bracket takes priority when delivering health information. In fact, elderly in Korea have difficulty in understanding contents necessary for use of a medical institution such as examination directions or a consent form and this indicates that their ability to read documented material used in a hospital or a health and medical institution and understand detailed contents properly is very low. In order to help elderly with a chronic disease in rural areas where a high frequency of ageing population and high chronic disease prevalence are shown to improve their health literacy essential for obtaining necessary health information and using a medical institution, a continuous management is necessary through repetitive and direct education using the resource of learners who are trained for customized medical information by considering the regional and psychological characteristics of elderly.

As a result of this study, social support was 4.72 points on average based on the 7-point scale, and family support was 5.03 points, support from others was 4.59 points and support from friend was 4.53 points which were the sub areas. A study targeting the elderly with a chronic disease [23] also showed similar scores and trends with the results of this study. In a study investigating the factors influencing the medication adherence targeting a person with a chronic disease, social-support was the highest influential factor on the medication adherence, and among the social- supports, as family support was stronger, the level of medication adherence of a person

with a chronic disease increased and it acted as a medium to help the person with a chronic disease to have a will to continue medication [24]. Most elderly showed a high level of dependence on their family for the health maintenance and overall daily life, but in consideration of current situation of rural area where the number of elderly who live alone is increasing rapidly, there is a limit to assert the reinforcement of family support. It was confirmed from the results of this study that support from others and support from family were also positive resources, and female elderly were more influenced by support from friend than support from family, and the interaction with other patients and social-support helped improving the subjective health condition and health promotion. A friend has similar age, interest and lifestyle, so support from friend can more influence a senior citizen than support from family, and the results of this study showed that support from others and support from family showed similar influence, conforming to the results of the study conducted by Lee and Lee [25], indicating that support from friend among the social-supports showed a greater influence. It is necessary to find a measure that can improve the satisfaction in life through the relationship with various resources and utilize the resource of care in a friendly place such as a senior citizen center and a community hall, and it is also necessary to find a measure that can improve the satisfaction in life through comprehensive support including economic resource of a local community.

The result of this study showed that the self-efficacy was 3.18 points based on the 5-point scale which was the middle level. There was a slight difference according to the characteristics of target elderly, and the self-efficacy was 3.20 points in the study [26] targeting elderly with a chronic disease who used a public health center and 2.79 points in the study [27] targeting elderly living in a facility. The results of the study conducted by Yoo [26] using the same tool showed higher self-efficacy than the results of this study because the average age of the elderly was lower and the elderly performed greater activities such as attendance in an elderly college and a silver hall, showing higher self-efficacy. The results of the study conducted by Oh et al [27] showed lower self-efficacy due to the influence of limited living environment of elderly in a facility, so it is necessary to determine factors that may influence the degree of self-efficacy and consider a difference in the self-efficacy according to the living territory when applying the nursing intervention program. The results of scheffe post-hoc test for confirming the level of self-efficacy of elderly showed that their self-efficacy was higher as their education level was higher and their monthly income was higher and this result was the same with the result of the study targeting elderly who visited a seniors welfare center [28]. This indicates that as their monthly income is higher, their financial burden on their treatment is reduced and their social and psychological peace is maintained, increasing their self-efficacy. In other words, it was confirmed that the elderly could maintain their health condition well as they were younger and their financial and education level were higher,

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and their self-efficacy was higher as their daily living ability was more active.

The medication adherence in this study was 5.81 points on average. The medication adherence was 6.60 points and 6.09 points on average in the study conducted by Morisky et al [19] targeting hypertension patients and the study conducted by Kim [29] patients with a coronary artery disease, respectively, that were higher than the results of this study, and the medication adherence was 5.86 points in the study conducted by Park [30] targeting stroke patients that was similar to the results of this study. There was a difference in the degree of medication adherence according to age, and the average age of elderly was 68.88 in the study conducted by Park [30], 57.70 in the study conducted by Kim [29] and 52.50 in the study conducted by Morisky et al [19], lower than the average age of elderly in this study which was the age of 76.4, showing a higher degree of medication adherence than the degree of medication adherence shown in this study, confirming the results of this study that the degree of medication adherence is lowered as the target elderly is older. According to the results of this study, the group showing moderate medication adherence was 48% which was the largest, the group showing low medication adherence was 41% and the group showing high medication adherence was 10%, and in comparison to the study targeting the hypertension patients [19] indicating that the group showing moderate medication adherence was 52.0% which was the largest, the group showing low medication adherence was 32.1% and the group showing high medication adherence was 15.9% that was similar to the results of this study. In addition, the medication adherence was lower as their monthly income was lower, and this result conformed to the report showing that 23% of people with a chronic disease failed to take medicine according to the prescription due to their financial problem [31].

As a result of this study, the medication adherence had a significant correlation with self-efficacy, health literacy, and social support. This result was the same as the result of the studies [12,24] showing high medication adherence due to a significant correlation between the social support and self-efficacy of elderly with a chronic disease, and high medication adherence was shown due to a significant correlation between the health literacy and self-efficacy of elderly [11,33], supporting this study. Therefore, it indicates that the medication adherence is better as the elderly show higher self-efficacy, higher social support, and higher health literacy.

The result of this study showed that major factors influencing the medication adherence were self-efficacy and the number of medications per day, and in the precedent study [33] targeting elderly in a local community, self-efficacy had the highest relative influence on health behavior, showing a consistent opinion on self-efficacy for health behavior, so as the self-efficacy was higher, the medication adherence was better. Moreover, as the number of medications per day increased, the medication adherence was lower, supporting the result of the precedent study [32] indicating that in case of taking medication for once a day, the medication adherence was 43.3% and in case of taking medication four times a day, the medication adherence decreased to 23%. This is because once the number of medications per day increased,

non-compliance of taking medicine by elderly with a chronic disease living in rural areas increased due to the burden of taking medication and their lowered cognitive function and memory. Therefore, in order to improve the medication adherence targeting the elderly with a chronic disease in rural areas showing high frequency of number of medications per day, it is necessary to assess the medication adherence accurately and find a nursing intervention strategy based on the findings, and it is also necessary to develop various programs for reinforcing the self-efficacy which shows the highest influence on the medication adherence preferentially. Various systems that support the self-management of elderly with a chronic disease in rural areas are necessary, and active efforts of nurses who secure various resources for elderly living alone and help elderly are required.

### V. CONCLUSION

The above results presented that the elderly with a chronic disease in rural areas showed slightly higher degree of health literacy, low social support, and moderate self-efficacy. There was a difference in the degree of medication adherence according to age, monthly income, subjective health condition, daily living ability, number of medications per day, social support and self-efficacy. It was also confirmed that the number of medications per day and self-efficacy were the factors having significant influence on the medication adherence of elderly with a chronic disease in rural areas. It is expected to provide customized medical information by considering the level of elderly, develop and apply a self-efficacy improvement program for health behavior using the resource of extensive social support according to an increase in the number of senior citizen living alone in order to improve the medication adherence of elderly with a chronic disease in rural areas.

Based on the results of this study, the following is suggested.

This study is carried out targeting the elderly with a chronic disease who take medication prescribed by a small and medium sized hospital in some areas and it is suggested to perform a follow-up study to monitor elderly in a more extensive area who take oriental medicine and folk drugs at the same time for a long period of time. According to the results of this study, it was confirmed that the number of medications per day and self-efficacy were the variables influencing medication adhere of the elderly with a chronic disease, so nurses in a local community should include a program that can improve self-efficacy when conducting education targeting elderly with a chronic disease in rural areas and a study to verify the effect of educational program should be carried out.

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