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The Effects of Self-efficacy and Self-stigma on Self-care in People with Diabetes

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Purpose: This descriptive study investigated the effects of self-efficacy and self-stigma on self-care in people with diabetes. **Methods:** The study included a total of 377 patients with diabetes enrolled in university hospitals in D city and public health centers in S city. Data were collected from 1 July to 31 August, 2017, and were analyzed using descriptive statistics, t-test, analysis of variance, Pearson's correlation coefficient, and hierarchical multiple regression. **Results:** Diabetes self-care was positively correlated with diabetes self-efficacy, whereas it was negatively correlated with diabetes self-stigma. Participants' education level, marital status, perceived health status, type of medication, self-efficacy, and self-stigma explained 42.4% of the variance in diabetes self-care. **Conclusion:** The findings indicate that diabetes self-efficacy and self-stigma are important factors for improving self-care in patients with diabetes. Therefore, systematic programs for enhancing self-efficacy and reducing self-stigma of these individuals should be developed.

Key Words: Diabetes mellitus; Self care; Self efficacy; Social stigma

INTRODUCTION

1. Background

In Korea, diabetes occurs in about 1 in 7 of adults aged >30 years, whereas about 3 in 10 people aged >65 are diabetes [1]. Diabetes is divided into types 1 and 2. Type 2 is mainly caused by a combination of insulin resistance and relative insulin deficiency, compared to type 1 diabetes, which absolutely requires insulin therapy due to the destruction of pancreatic insulin-producing beta cells [2]. The goal of managing diabetes is to attain an adequate blood sugar control. Unlike patients with type 1 diabetes, who receive absolute insulin treatment, patients with type 2 diabetes are to see a doctor regularly to control their blood sugar levels and manage the aspects of lifestyle such as diet and exercise therapy, in addition to taking prescribed drugs, which is very important [3]. Thus, many studies have been conducted aiming to increase the self-care performance rate of patients with diabetes [4-8]. Self-efficacy is well known to affect the self-care of diabetes.

Self-efficacy is the ability to successfully establish and change motivations, cognitive resources, and action plans necessary for an individual to effectively manage their life events [9]. Diabetes self-efficacy refers to confidence in self-care items that must be implemented to manage this condition [10]. If diabetes self-efficacy is low, confidence in self-care practices decreases, resulting in poor self-care performance [7], and prior studies have found that it is a factor that directly influences the change and continuation of self-care behavior [11]. However, until now, the blood sugar control rate of patients with diabetes in Korea has been 28.3%, which is less than 30%, meaning that a new approach to self-care is required [1].

Stigma refers to the reduction and devaluation of a normal and complete individual to a filthy and insignificant life [12]. It can be broadly divided into social and self-stigma. Self-stigma is a stigma at the individual level, which implies accepting socially shared stereotypes and

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prejudices and applying them to devalue oneself [13]. Diabetes self-stigma means that people with diabetes devalue themselves and have negative feelings about their disease [14]. In particular, in chronic diseases, self-stigma may lead to avoidance of treatment or decreased adherence to treatment, which may affect self-care [15-17].

However, when considering the research on self-care in patients with diabetes, most studies have looked at the relationship between knowledge of diabetes self-care, information comprehension ability, empowerment, and variables such as depression and stress. However, research on this topic is scarce. In addition, most studies on stigma in patients with diabetes have not used developed tools or have been conducted using social stigma tools. However, in patients with diabetes, stigma is mainly related to the treatment process rather than the symptoms of the disease, and self-stigma is more important than social stigma because the disease is not visible outside [14]. In addition, because self-stigma is influenced by cultural background or disease characteristics, measurement tools that reflect the characteristics of diabetes and social perceptions should be used [14]. The diabetes self-stigma measurement tool used in this study was developed for patients with diabetes in Korea, and it reflects the cultural background and characteristics of the disease in Korea.

Therefore, this study examined the degree of self-efficacy, self-stigma, and diabetes self-care in patients with type 2 diabetes, and the effects of self-efficacy and self-stigma on diabetes self-care.

2. Purpose

This study aimed to explore the effects of self-efficacy and self-stigma on diabetes self-care, and it had the following goals. First, the degree of self-efficacy, self-stigma, and diabetes self-care in patients with type 2 diabetes were identified. Second, the differences in self-efficacy, self-stigma, and diabetes self-care according to general characteristics in patients with type 2 diabetes were identified. Third, the correlation between self-efficacy, self-stigma, and self-care in patients with type 2 diabetes was investigated. Fourth, the effect of self-efficacy and self-stigma in patients with type 2 diabetes on self-care of diabetes was investigated.

METHODS

1. Study Design

This study is a secondary analysis study using the data collected to conduct a development of the self-stigma scale for people with diabetes mellitus. In addition, this is a descriptive research study conducted to explore the effects of self-efficacy and self-stigma on diabetes self-care in patients with type 2 diabetes.

2. Participants

This study analyzed a total of 377 participants, excluding data from insufficient responses, data of patients with type 1 diabetes, and data of patients admitted to hospital from the data collected for the development of a self-stigma scale for people with diabetes.

3. Measures

1) Self-Efficacy

The measurement of self-efficacy was developed by the Stanford Patient Education Research Center and translated into Korean by Chang et al. [10] using the Korean version of the Diabetes Self-Efficacy Scale. This tool consists of 8 items (such as diet, exercise, blood sugar monitoring and management, hospital visits, and self-control), and a 10-point Likert scale. The higher the average value, the higher the diabetes self-efficacy. In the study by Chang et al. [10], the reliability of the tool was determined by a Cronbach's α of .89. In our study, Cronbach's α was .84.

2) Self-Stigma

The self-stigma measurement tool developed by Seo [18] was used. It consists of 16 questions divided into a total of 4 sub-scales (such as comparative incompetence, social withdrawal, self-devaluation, and apprehensive feeling), including 16. Furthermore, each question was measured on a 5-point Likert scale. The higher the average value, the higher the self-stigma of diabetes. At the time of tool development, the reliability of the tool in Seo [18]'s study was determined by a Cronbach's α of .89. In our study, Cronbach's α was .90.

3) Diabetes Self-Care

Diabetes self-care is a Korean version of the Summary of Diabetes Self-Care Activities Questionnaire, developed and revised by Toolbert and Glasgow [19], which was adapted to the Korean situation. This tool consists of a total of 17 questions, including 5 dietary items, 2 exercise items, 3 items on drugs, 2 on blood glucose tests, and 5 on foot care. Each item can be evaluated on a scale from 0 to 7, depending on the date of self-care. The higher the score, the higher the degree of self-care behavior. In the study by Chang and

Song [20], the reliability of the tool was indicated by a Cronbach's α of .77. In our study, Cronbach's α was .74.

4. Ethical Considerations

The raw study data were collected from July 1st to August 31st, 2017, after obtaining approval from the Institution Review Board of College of Nursing in Chungnam National University (IRB No.: 제2-1046881-A-N-01호-2017 05-HR-012). For data collection, a questionnaire survey was administered to volunteers who agreed to participate in the study after being explained its purpose and procedure. They were patients with diabetes who visited the public health center in S city and the endocrinology department of the general hospital located in D city. Before distributing the questionnaire, the subjects were asked to fill out a self-written questionnaire after explaining the purpose and necessity of the study and obtaining written consent that they could refuse to participate in the study and that they could withdraw from the study at any time.

The analysis in this study was conducted using the above raw data after obtaining approval from the Institution Review Board of Joongbu University (IRB No.: JIRB-2020080301-01).

5. Statistical Analysis

The collected data were analyzed using the SPSS/WIN 24.0 program. The general characteristics and degree of independent variables were analyzed using descriptive statistics. The differences in independent variables according to general characteristics were analyzed by t-test and ANOVA, and Scheffé was used for the post-test. Pearson's correlation coefficients were calculated for the correlation between independent variables. In addition, hierarchical multiple regression was used to clarify the effects of self-efficacy and self-stigma on diabetes self-care. The sequence and nominal scale variables were treated with dummy variables.

RESULTS

1. General Characteristics and Degree of Independent Variables

There were 41.4% male and 58.6% female subjects in this study. In addition, subjects aged 25~92 years participated in the study, and the average age was 66.07 years. The percentage of participants aged ≤49 years was the highest at 34.5%. In terms of education, elementary school level was the highest at 32.9%, and the percentage of those who were married was 73.7%. A total of 43.8% of the participants were employed, and 44.6% answered that their subjective health status was moderate. The average prevalence of diabetes was 11.83 years, and the percentage of those with a prevalence >21 years was the highest at 41.4%. The most common type of treatment hospitals were university hospitals (48.8%), and the most common type of diabetes treatment was oral administration (73.7%). The percentage of people who received diabetes management education was 54.9%.

The average score of the subject's self-efficacy was 6.46 ±1.95. The score for self-stigma was 2.70±0.80 out of 5 points. In the lower region, apprehensive feeling 3.42± 0.97 points, comparative inability 2.83±1.22 points, social withdrawal 2.35±1.04 points, and self-devaluation 2.19± 0.98 points were in order. The diabetes self-care score was 3.10±1.23 points (Table 1).

2. Difference of Independent Variables according to General Characteristics

Table 2 shows the differences between self-efficacy, self-stigma, and diabetes self-care according to general characteristics. Self-efficacy was found to differ significantly with the level of education, marital status, employment, subjective health status, type of medical institution applying the treatment, and the experience with education in diabetes management. Middle school diploma or higher ($F=6.62$, $p<.001$), married people ($t=2.29$, $p=.023$), those with good subjective health ($F=15.52$, $p<.001$), those who received treatment at general hospitals and university hospitals ($F=3.87$, $p=.011$), and those who received diabetes management education ($t=2.06$, $p=.040$) had higher self-efficacy.

Self-stigma showed significant differences according to sex, age, level of education, marital status, employment, subjective health status, diabetes prevalence period, type of medical institution to be treated, and type of treatment. Males ($t=2.45$, $p=.015$), individuals older than 70 ($F=4.23$, $p=.007$), those who graduated from elementary school ($F=10.78$, $p<.001$), unmarried ($t=-2.72$, $p=.007$), unemployed ($t=-1.27$, $p<.001$), those with a lower subjective health status ($F=56.41$, $p<.001$), those with a longer prevalence period ($F=4.86$, $p=.003$), those who received treatment in general hospitals ($F=2.69$, $p=.049$), and those who took oral and insulin therapies together ($F=5.81$, $p=.003$) had a higher degree of self-stigma.

Diabetes self-care showed significant differences considering age, education level, marital status, employment,

Table 1. General Characteristics (*N*=377)

Characteristics	Categories	n (%)	M±SD	Range
Gender	Male	156 (41.4)		
	Female	221 (58.6)		
Age (year)	≤49	130 (34.5)	66.07±12.02	25.00~92.00
	50~59	100 (26.5)		
	60~69	96 (25.5)		
	≥70	51 (13.5)		
Education level	Elementary school	124 (32.9)		
	Middle school	60 (16.0)		
	High school	116 (30.8)		
	University	76 (20.3)		
Having spouse	Yes	278 (73.7)		
	No	99 (26.3)		
Employment	Yes	165 (43.8)		
	No	212 (56.2)		
Perceived health status	Good	78 (20.7)		
	Fair	168 (44.6)		
	Poor	131 (34.7)		
Duration of diabetes (year)	≤5	31 (8.2)	11.83±9.42	1.00~40.00
	6~10	84 (22.3)		
	11~20	106 (28.1)		
	≥21	156 (41.4)		
Type of hospital	Clinic	84 (22.3)		
	General hospital	72 (19.1)		
	University hospital	184 (48.8)		
	Public health center	37 (9.8)		
Type of medication	PO	278 (73.7)		
	Insulin	65 (17.3)		
	PO + insulin	26 (6.9)		
	Diet therapy	8 (2.1)		
Experience of managing diabetes education	Yes	207 (54.9)		
	No	170 (45.1)		
Self-efficacy			6.46±1.95	1.00~10.00
Self-stigma			2.70±0.80	1.00~4.94
Comparative inability			2.83±1.12	1.00~5.00
Social withdrawal			2.35±1.04	1.00~5.00
Self-devaluation			2.19±0.98	1.00~5.00
Apprehensive feeling			3.42±0.97	1.00~5.00
Diabetes self-care			3.10±1.23	0.27~6.27

PO=per Os.

subjective health status, type of medical institution providing treatment, type of treatment, and experience in diabetes management education. Individuals aged <70 years (F=8.47, p<.001), those with junior high school or higher (F=16.62, p<.001), married individuals (t=5.08, p<.001), employed individuals (t=2.47, p=.014), those with a better subjective health status (F=12.10, p<.001), those receiving treatment at general hospitals and university hospitals (F=8.68, p<.001), and those receiving oral and insulin therapy (F=5.81, p=.003) and those who had diabetes management education (t=3.08, p=.002) showed a high degree of self-care.

Table 2. Differences of Self-Efficacy, Self-Stigma and Diabetes Self-Care according to General Characteristics (*N*=377)

Characteristics	Categories	Self-efficacy		Self-stigma		Diabetes self-care	
		M±SD	t or F (*p*) Scheffé	M±SD	t or F (*p*) Scheffé	M±SD	t or F (*p*) Scheffé
Gender	Male	6.44±1.91	0.18	2.58±0.78	2.45	3.18±1.14	-1.10
	Female	6.48±1.98	(.855)	2.78±0.81	(.015)	3.04±1.30	(.271)
Age (year)	≤49[a]	6.45±2.03	2.31	2.63±0.77	4.23	3.19±1.36	8.47
	50~59[b]	6.61±1.78	(.079)	2.62±0.78	(.007)	3.51±0.03	(<.001)
	60~69[c]	6.79±1.99		2.53±0.80	c<d	3.24±1.16	b, c>d
	≥70[d]	6.16±1.97		2.87±0.80		2.76±1.28	
Education level	Elementary school[a]	5.88±1.90	6.62	3.00±0.74	10.78	2.53±1.22	16.62
	Middle school[b]	6.71±2.01	(<.001)	2.46±0.75	(<.001)	3.13±1.14	(<.001)
	High school[c]	6.64±1.20	a<b, c, d	2.65±0.80	a<b, c, d	3.31±1.08	a<b, c, d
	University[d]	6.96±1.72		2.48±0.82		3.69±1.18	
Having spouse	Yes	6.60±1.89	2.29	2.63±0.82	-2.72	3.28±1.15	5.08
	No	6.08±2.07	(.023)	2.89±0.74	(.007)	2.57±1.31	(<.001)
Employment	Yes	6.67±1.89	1.85	2.50±0.79	-4.27	3.27±1.13	2.47
	No	6.30±1.98	(.065)	2.85±0.78	(<.001)	2.96±1.29	(.014)
Perceived health status	Good[a]	7.41±1.86	15.52	2.13±0.68	56.41	3.54±1.18	12.10
	Fair[b]	6.47±1.83	(<.001)	2.59±0.68	(<.001)	3.20±1.14	(<.001)
	Poor[c]	5.90±1.95	a>b>c	3.18±0.75	a<b<c	2.71±1.27	a>b>c
Duration of diabetes (year)	≤5[a]	6.41±1.84	1.68	2.57±0.75	4.86	3.15±1.19	2.06
	6~10[b]	6.65±2.04	(.174)	2.60±0.82	(.003)	3.26±1.19	(.108)
	11~20[c]	6.15±2.08		2.83±0.80	a, b<d	2.83±1.32	
	≥21[d]	6.81±1.75		2.99±0.81		3.18±1.22	
Type of hospital	Clinic[a]	6.16±1.84	3.87	2.71±0.79	2.69	2.76±1.15	8.68
	General hospital[b]	6.34±1.92	(.011)	2.90±0.72	(.049)	3.22±1.22	(<.001)
	University hospital[c]	6.79±1.95	a, b, c>d	2.60±0.84	b>c	3.35±1.16	a, d<b, c
	Public health center[d]	5.78±2.03		2.76±0.74		2.39±1.38	
Type of medication	PO[a]	6.36±2.00	2.06	2.60±0.76	5.81	2.95±1.25	5.34
	Insulin[b]	7.02±1.53	(.128)	2.97±0.75	(.003)	3.41±1.11	(.005)
	PO + insulin[c]	6.56±1.93		3.04±0.89	a, d<c	3.52±1.09	a<c
	Diet therapy[d]	7.34±1.67		2.60±0.71		3.65±1.27	
Experience of managing diabetes education	Yes	6.65±1.91	2.06	2.74±0.82	1.08	3.27±1.20	3.08
	No	6.24±1.98	(.040)	2.65±0.78	(.282)	2.88±1.24	(.002)

PO=per Os.

3. Correlations between Self-Efficacy, Self-Stigma, and Diabetes Self-Care

Table 3 shows the correlation between self-efficacy, self-stigma, and diabetes self-care. Diabetes self-stigma and self-efficacy were found to have a significant positive correlation (r=.56, p<.001). Self-efficacy was negatively correlated with self-stigma (r=-.20, p<.001). On the sub-scale, there was a negative correlation with significant apprehensive feelings (r=-.21, p<.001) and comparative inability (r=-.17, p=.005). In addition, there was no correlation between social withdrawal (r=-.14, p=.060) and self-devaluation (r=-.10, p=.060). Diabetes self-care showed no correlation with self-stigma (r=-.02, p=.657) (Table 3).

4. The Effect of Self-Efficacy and Self-Stigma on Diabetes Self-Care

As a result of examining the multicollinearity of the independent variables before performing the regression analysis, the tolerance limit ranged from 0.74 to 0.96, and the variance inflation factor was 1.04~1.35. The problem of multicollinearity was not found. The Durbin-Watson was 1.728, confirming the independence of adjacent error terms.

Table 4 shows the results of a hierarchical multiple regression analysis conducted to identify factors affecting diabetes self-care. In Step 1, general characteristics were input as dependent variables among general character-

Table 3. Correlation among Self-Efficacy, Self-Stigma and Diabetes Self-Care (*N*=377)

Variables	Self-efficacy	Diabetes Self-care
	r (*p*)	r (*p*)
Self-efficacy	1.00	.56 (<.001)
Self-stigma	-.20 (<.001)	-.02 (.657)
Comparative inability	-.17 (.005)	-.06 (.231)
Social withdrawal	-.14 (.060)	.07 (.139)
Self-devaluation	-.10 (.060)	.02 (.734)
Apprehensive feeling	-.21 (<.001)	-.11 (.041)

istics. As a result, the fitness of Model 1 was statistically significant (F=7.65, p<.001), and 21.0% explained diabetes self-care. Factors influencing diabetes self-care were having a high school diploma (β=.36, p=.015), having a university degree or higher (β=.62, p<.001), being married (β=-.26, p=.017), having a poor subjective health status (β=-.48, p<.001), university hospitals (β=.25, p=.045) as the type of medical institutions, and oral medication and insulin combination treatment groups among the types of treatment (β=.48, p<.001).

In Step 2, self-efficacy was added and analyzed. As a result, the explanatory power of Model 2 was 40.5%. The model fit was also statistically significant (F=16.97, p<.001). Factors that have significant explanatory power for diabetes self-care were having a high school diploma or higher (β=.28, p=.028), having a university degree or higher (β=.49, p<.001), being married (β=-.26, p=.007), belonging to oral drug and insulin combination treatment groups (β=.40, p<.001), and self-efficacy (β=.46, p<.001).

In Step 3, the effect of self-stigma on self-care in patients with diabetes was analyzed so that the general characteristics and self-efficacy were controlled by adding self-stigma. As a result, the explanatory power of Model 3 was 42.4%, and the model fit was also statistically significant (F=17.27, p<.001). Factors that showed significant explanatory power for diabetes self-care were having a high school diploma or higher (β=.30, p=.016), having a university degree or higher (β=.52, p<.001), being married (β=-.26, p=.006), having poor subjective health status (β=-.43, p=.009), belonging to oral drug and insulin combination therapy groups (β=.34, p=.002), self-efficacy (β=.48), p<.001), and self-stigma (β=.16, p<.001) (Table 4).

DISCUSSION

This study aimed to examine the degree of diabetes self-care in patients with type 2 diabetes and to determine the effects of self-efficacy and self-stigma on diabetes self-care. The subject's self-efficacy was moderate with an average score of 6.46 points (range 1~10 points), which was lower than 71.47 points (range 10~100 points) in Seo and Choi [11]'s study 2.92 points (range 1~4 points) in the study by Keum et al. [21]. In the present study [11], there was a no significant difference in self-efficacy considering the level of education and marital status, but the result was consistent with that there is no significant difference according to the age, and that there is a significant difference according to the diabetes management education experience. And it I consistent with another previous study [21] that there was a difference according to the level of education, but it was different from that of the difference according to age. The reason why the general characteristics influencing self-efficacy vary may be because the age groups and regions of the subjects included in each study were different. However, the difference among the tools used may also be a contributing factor. The tools used in this study consisted of 8 questions, but the tools used in each preceding study consisted of 38 questions [11] and 17 questions [21], respectively. The sub-scales included in the measurement were also different. Each tool for measuring self-efficacy in diabetes patients was verified via validity and reliability. However, it will benefit future studies if the pros and cons of tools and differences in the target participants are clarified through a literary review. Therefore, a systematic literary review should be conducted to provide a guide for researchers by analyzing tool advantages and disadvantages.

Self-stigma scored 2.70 points (range 1~5 points), and on the sub-scale, the scores were high in the order of apprehensive feeling, comparative inability, social withdrawal, and self-devaluation. In addition, the self-stigma of the study subjects was found to differ according to gender, age, education level, marital status, employment, subjective health status, diabetes prevalence period, type of medical institution, and type of treatment. Compared to the stigma score of 1.82 points (range 0~3 points) in the self-stigma study [3] conducted on patients with type 2 diabetes in Japan, the self-stigma score of patients with

Table 4. Factor Influencing Diabetes Self-Care (*N*=377)

Variables	Model 1					Model 2					Model 3				
	B	β	SE	t	*p*	B	β	SE	t	*p*	B	β	SE	t	*p*
(Constant)	3.43		.43	7.96	<.001	1.45		.41	3.49	<.001	0.69		.45	1.51	.130
Age (year)	-0.00	-.02	.00	-0.36	.715	-0.00	-.02	.00	-0.53	.591	-0.00	-.02	.00	-0.55	.577
Education level															
Elementary school (ref.)															
Middle school	0.34	.27	.19	1.78	.075	0.22	.17	.16	1.32	.185	0.26	.23	.16	1.77	.078
High school	0.44	.36	.18	2.43	.015	0.34	.28	.15	2.20	.028	0.37	.30	.15	2.41	.016
University	0.76	.62	.20	3.67	<001	0.61	.49	.18	3.37	<.001	0.64	.52	.17	3.62	<.001
Having spouse															
Yes (ref.)															
No	-0.33	-.26	.13	-2.40	.017	-0.32	-.26	.11	-2.70	.007	-0.32	-.26	.11	-2.76	.006
Employment															
Yes (ref.)															
No	0.09	.07	.13	0.67	.499	0.11	.08	.11	0.94	.345	0.047	.05	.11	0.64	.522
Perceived health status															
Good (ref.)															
Fair	-0.24	-.19	.15	-1.56	.118	0.02	.01	.13	0.15	.873	-0.08	-.06	.13	-0.60	.545
Poor	-0.59	-.48	.17	-3.47	<.001	-0.20	-.16	.15	-1.30	.193	-0.43	-.34	.16	-2.61	.009
Type of hospital															
Clinic (ref.)															
General hospital	0.26	.21	.18	1.48	.140	0.23	.19	.15	1.49	.136	0.21	.17	.15	1.37	.172
University hospital	0.30	.25	.15	2.01	.045	0.17	.14	.13	1.30	.192	0.19	.15	.13	1.48	.138
Public health center	-0.03	-.03	.22	-0.17	.859	-0.00	-.00	.19	-0.02	.979	0.02	.01	.19	0.11	.909
Type of medication															
PO (ref.)															
Insulin	0.38	.31	.23	1.64	.100	0.17	.13	.20	0.84	.399	0.10	.08	.20	0.51	.606
PO+insulin	0.59	.48	.15	3.76	<.001	0.49	.40	.13	3.62	<.001	0.43	.34	.13	3.15	.002
Diet therapy	0.64	.52	.39	1.61	.107	0.36	.29	.34	1.06	.289	0.35	.28	.34	1.03	.302
Experience of managing diabetes education															
Yes (ref.)															
No	-0.22	-.18	.11	-1.89	.058	-0.15	-.12	.10	-1.50	.133	-0.11	-.09	.10	-1.16	.245
Self-efficacy						0.29	.46	.02	10.91	<.001	0.30	.48	.25	11.37	<.001
Self-stigma											0.26	.16	.07	3.61	<.001
	R^2=.21, F=7.65, p<.001					R^2=.41, F=16.97, p<.001					R^2=.42, F=17.27, p<.001				

PO=Per Os; ref.=reference.

type 2 diabetes in Korea was low. However, it is difficult to compare scores simply because the tools used in Japan were developed for minorities in Hong Kong at the time of development. This study showed that self-stigma in patients with type 2 diabetes differed according to several general characteristics, which indicates that the formation of stigma is highly influenced by personal factors, as well as the social environment.

In this study, there was a negative correlation between self-efficacy and self-stigma. The same results were found in a study of patients with type 2 diabetes in Japan [23]. Self-stigma in patients with diabetes is a direct factor that lowers self-efficacy and affects self-care behavior by lowering self-efficacy or self-esteem [2]. Looking at the subscale, it was found that it was particularly closely related to apprehensive feelings and comparative inability. Among the sub-scales in this study, social withdrawal and self-devaluation showed no correlation with self-efficacy. These results can be thought of as apprehensive feeling and comparative inability to reduce confidence in managing diabetes. However, in a qualitative study on the life experiences of diabetes [22], it was difficult to find a domestic

study on self-stigma of diabetes except that diabetes were reluctant to reveal their disease and felt defeated by social stigma. However, considering the results of this study and previous studies that self-stigma directly affects self-efficacy of diabetes patients [3], follow-up studies are needed to explore the path that self-stigma of diabetes patients affects self-efficacy.

The degree of self-care of the subjects in this study was 3.10 points (range 0~7 points), and there was a difference according to age, education level, marital status, employment, subjective health status, type of medical institution that applied the treatment, type of treatment, and experience in diabetes management education. This is lower than the 3.53 score in Seo and Choi [11]'s study, as well as the 4.74 score in Oh and Lee [5]'s study. In addition, the finding is consistent with Seo and Choi [11]'s study that showed a difference according to diabetes-related factors such as the treatment type and diabetes management education experience, but this is different from the finding that there was no difference in self-care according to general characteristics. When looking at the general characteristics of the subjects in this study, it may be considered that this is because many of the elderly people in their 70s to 90s were included in the study. It is also believed that this is because the educational level of the subjects in this study is lower than that of previous studies [5]. Currently, the prevalence of diabetes in Korea is 26.9% for those aged >30 years, but 29.6% for those aged >65 years, and the prevalence rate also increases with age. This rate is leading to a slight difference [1]. Currently, the age range defining the elderly group is changing, and to increase the management rate of diabetes in elderly in the trend of increasing the number of highly educated elderly. Studies that provide prevalence by subdividing the range of elderly people or report their management status are insufficient. Therefore, it is necessary to identify the prevalence and management status of diabetes by subdividing the age level of elderly patients with diabetes in future research.

Diabetes self-care showed a positive correlation with self-efficacy, which is consistent with previous studies [11]. However, a direct correlation between diabetes self-care with self-stigma has not been found. As a result of the hierarchical regression analysis in this study, in Model 2, in which general characteristics were controlled and self-efficacy was added, self-efficacy was found to be a factor affecting diabetes self-care along with the education level, marital status, and treatment type. As a result of hierarchical regression with an additional input of self-stigma, self-stigma was found to be a variable that affects diabetes self-care along with the education level, marital status, subjective health status, treatment type, and self-efficacy. Self-stigma was found to be a strong factor affecting diabetes self-care, although it showed no direct correlation with diabetes self-care. This is in line with the finding by Kato et al.[3] according to which self-stigma is a direct factor influencing diabetes self-care, as well as an indirect factor influencing diabetes self-care, while lowering self-esteem and self-efficacy. Self-stigma has been reported to reduce the subject's access to treatment [23] and decreased motivation for essential treatment. This means that self-stigma directly affects the treatment intention or treatment attitude of subjects with chronic disease. However, in this study, there was no direct correlation found, but it was found to be a strong influencing factor for diabetes self-care in the controlled state of general characteristics. This may be because the generation of self-stigma is affected by environmental or personal factors. Therefore, future studies will have to examine the path analysis to find the modulating or mediating variables that affect the relationship between the two variables of diabetes self-care and self-stigma. In addition, self-efficacy and self-care have been found to be variables that strongly influence diabetes self-care, and strategies to increase self-efficacy and reduce self-stigma are necessary when developing programs to improve self-care in patients with diabetes. In particular, if such a program mainly focuses on cognitive behavioral therapy to increase knowledge or awareness, it will be necessary to develop and verify a systematic program to reduce diabetes self-stigma in the future.

CONCLUSION

According to study findings, diabetes self-care showed a positive correlation with self-efficacy and negative correlation with self-stigma. In addition, self-efficacy and self-stigma were identified as significant factors influencing diabetes self-care. Moreover, it was confirmed that these two variables may function as factors that could increase the rate of diabetes self-care. Accordingly, we verified the necessity of establishing a self-care program to improve the self-efficacy in patients with diabetes and reduce self-stigma to improve the rate of diabetes self-care. Based on the study results, we first propose a systematic literature review study on a tool for measuring diabetes self-efficacy. Second, we suggest a large-scale repeated study on self-stigma targeting type 2 diabetes patients. Third, we point out that it is necessary to develop a nursing intervention program to lower the self-stigma of patients with type 2 diabetes and verify its effectiveness.

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