Factors associated with Patient Activation for Self-management among Community Residents with Osteoarthritis in Korea

Ahn, Yang Heui[1] · Kim, Bong Jeong[2] · Ham, Ok Kyung[3] · Kim, Seong Hoon[4]

[1]Department of Nursing, Yonsei University Wonju College of Medicine, Wonju
[2]Department of Nursing, Cheongju University, Cheongju
[3]Department of Nursing, Inha University, Incheon
[4]Department of Rehabilitation, Yonsei University Wonju College of Medicine, Wonju, Korea

Purpose: The purpose of this study was to survey patient activation for self-management and to identify factors associated with patient activation for self-management among community residents with osteoarthritis in Korea. **Methods:** Cross-sectional study design was used. Survey data were collected from 270 community residents with osteoarthritis through direct interviews. Studied factors included patient activation, joint pain, physical function, depression, and general characteristics. Data were analyzed using chi-squared test, t-test and multivariate logistic regression analysis. **Results:** The participants' mean score of patient activation was 56.0±16.61. The mean score of each factor was 10.6±5.89 for joint pain, 5.5±3.56 for physical function, and 19.3±10.01 for depression. The patient activation level was significantly associated with depression and general characteristics such as education, religion, comorbid hypertension, and use of medical clinics ($p<.05$). **Conclusion:** The findings suggest that depression, education, religion, comorbid hypertension, and use of medical clinics may be important factors to be considered when developing programs of patient activation for self-management. This is the first study that measured patient activation, and further studies are suggested to find factors associated with patient activation for self-management among community residents with other chronic diseases.

Key Words: Self-management, Osteoarthritis, Patient

INTRODUCTION

Worldwide, the prevalence of symptomatic osteoarthritis is 9.6 % in men and 18.0 % in women aged 60 years or over and 80 % of those people with osteoarthritis (OA) have mobility limitations and 25 % cannot perform major activities of daily life[1]. In Korea, the prevalence of OA was 5.1 % in men and 18.9 % in women aged 50 years or over in the 2010~2013 Korea National Health and Nutrition Examination Survey (KNHANES VI-1)[2].

OA is the most common form of arthritis and is a potentially debilitating disorder that can result in functional impairment and reduced independence in older adults, and in enormous societal and financial burdens in terms of lost earnings, health care costs, and reduced quality of life[3]. However it is often overlooked because the disease characteristics accompany the aging process. For the management of OA, the American Academy of Orthopedic Surgeons strongly recommended patient participation in self-management (SM) programs based on evidence[4]. SM refers to disease related tasks and skills with self-efficacy for managing their chronic conditions. OA patients have to become effective managers of their own health to control of modifiable risk factors such as sedentary lifestyle and unheal-

thy diet, so that they need to be activated to take responsibility for their own health care. Therefore patient activation for SM is considered as an increasingly important component of strategies to improve chronic illness care[5]. Patient activation for SM is defined as a construct that describes skills, beliefs, motivation, and behaviors that enable an individual to actively participate in his/her own health care[6]. More highly activated patients believe that their role in managing their health is important, have knowledge and confidence to act appropriately and will act to maintain or improve their health. Empirical studies indicate that people who are more activated are significantly morelikely to engage in self-management compared with people who score lower on activation scales[7,8]. Also patient activation is related to health status or health outcomes in chronic diseases such as better physical and mental functioning[8], glucose control[9], blood pressure control[7,10], and less depression[11]. People with multiple chronic conditions tend to have lower activation scores compared to people with only a single chronic condition[12], which indicates that having multiple conditions may necessitate greater self-management and more careful monitoring of one's health. Activation levels were especially higher for people at a younger age, men, people with higher education and incomes[13]. In nursing, only one research was found, in which patient activation was evaluated as a self-management elements [14].

Patient activation for SM has been studied in patients with chronic diseases in USA and other countries, but it has not yet been studied in Korean patients. Although nursing research on self-management of Korean patients with arthritis have been studied since 1990s including exercise or self-help education program[15,16], however never approached in aspect of patient activation. As described above, prior studies have shown that patient activation is related to self-management behaviors, health status/health related outcomes and socio-demographics [7-13]. Understanding patient activation for SM enables nurses to coach patients for enhancing their healthcare and health outcomes. Therefore, identifying factors associated with patient activation will be helpful evidence in designing intervention strategies to stimulate increases in activation among patients with chronic conditions. The purpose of this study was to describe patient activation for SM and to identify factors associated with patient activation for SM among community residents with osteoarthritis.

METHODS

1. Design and Sample

A cross-sectional survey design was employed. A convenience sample of 270 osteoarthritis patients was recruited from the three Community Health Posts located in W city, Korea. Using G*Power 3.1.2 program, a sample size of 265 cases was calculated to have a .90 efficacy in detecting small effect size at the 5% level of significance in two-tailed t-test analysis, indicating that the number of participants in this study was sufficient. The sampling inclusion criteria were (a) 40 years or older, (b) able to communicate using Korean, (c) doctor-diagnosed osteoarthritis, and (d) willingness to participate in this study. Exclusion criteria were (a) other severe physical pain beside joint pain, (b) a cognitive impairment or psychiatric disease, and (c) artificial joint implants.

This study was approved by the Institutional Review Board of the Yonsei university (YWNR-12-0-003). Patients were asked if they were willing to participate in the survey study. Benefits and risks of participation were discussed; patients agreeing to participate were provided informed written consents that included confidentiality and authorization to use and release health information. Data were collected by research assistants in January and February 2013, using face-to-face interviews during home visits.

2. Measures

patient activation was measured using the Korean version of the 13-item Patient Activation Measure (PAM 13-K) which is a scale assessing patients' knowledge, skills, and confidence for self-management of a chronic disease[6]. PAM is a unidimensional Guttman-like measure with a 4-point scale, structured developmentally in a hierarchic order with four stages. PAM has strong psychometric properties and has been shown to be a valid and reliable measure[12]. In Korea, translation and psychometric properties of the Korean version of PAM-13 have been validated using Rasch analysis, however the ranking according to the difficulty of items differed slightly from that in the original version[17]. Four possible responses on PAM13-K range from strongly disagree to strongly agree. Items with a response of 'not applicable' or with no response were scored as "missing". Based on responses to the 13-item measure, each participant was assigned an activation score that could be converted to a score ranging from 0 to 100[12]. Pre-

vious studies reported the PAM 13 items as having a Cronbach's α of .87[13]. The α coefficient of the PAM 13-K in the current study was .88. PAM was used after permission from Insignia Health Inc.

Joint pain was measured using the Korean Western Ontario and McMaster Universities Osteoarthritis Index (K-WOMAC), a specific measure assessing pain, stiffness, and physical function in patient with osteoarthritis in the hip or knee[18]. In the current study, the 7 items of the K-WOMAC were selected to measure self-reported joint pain and stiffness. Each item is scored on a 5-point Likert scale (0=none, 1=slight, 2=moderate, 3= severe, 4=extreme) with total scores ranging from 0 to 28, and a higher score indicating greater pain. A previous study reported the K-WOMAC 7 items as having a Cronbach's α of .81[19]. The Cronbach's α for this study was .89.

physical function was measured using the Korean version of 8-item Stanford Health Assessment Questionnaire Disability Scale (HAQDS) to assess arthritis health outcomes[20]. It was translated into Korean and a blind back-translation was performed by independent bilingual nurse scholars. This is a short version of the 22-item disability scale in the Stanford Health Assessment Questionnaire, in which items have been chosen to represent use of every major joint in the body. There are 4 possible responses for each question: 0=without any difficulty; 1=with some difficulty; 2=with much difficulty; and 3=unable to do. Possible scores range from 0 to 24 with higher scores on the HAQDS representing more severe disability in physical function. The Cronbach's α for the original instrument was .85[20], and for the current study, .85.

Depression was measured using the Korean Center for Epidemiologic Studies Depression Scale (K-CES-D), which was translated and tested for reliability and validity by Cho and Kim[21]. The 20 items are rated on a 4-point Likert scale (0=almost none, 1=1 to 2 days per week, 2=3 to 4 days per week, and 3=5 to 7 days per week) as a measure of frequency of symptoms experienced during the past week. Three items with negative meanings were reverse coded for statistical analysis. Possible scores ranged from 0 to 60 with higher scores representing more symptoms of depression. The Cronbach's α for Seo et al's study[22] was .85 and for the current study, .85.

General characteristics included gender, age, education, religion, occupation, marital status, living with family, type of health insurance, comorbidities, and use of medical clinics. Comorbid diseases were limited to the most prevalent diseases including hypertension,

diabetes, cardio-vascular disease, and use of medical clinics was measured whether or had been seen by a doctor once or more during the past 6 months.

3. Analytic Strategy

Data were analyzed using PASW Statistics 20.0 for Windows (SPSS Inc, Chicago, IL, USA). Descriptive statistics were used to describe the distribution of the study variables. x^2 test or t-test was used to analyze the association or differences between general characteristics or health status (joint pain, physical function and depression) and patient activation level. Multivariate logistic regression analyses were conducted to analyze factors associated with patient activation level. Patient activation level was divided into two categories (low & high) using the PAM mean score (56.0) as the cut-off point because of inconsistencies with the original hierarchic order. Dummy variables were created for categorical covariate variables. Statistical significance was determined at the .05 probability level.

RESULTS

1. Descriptive Statistics of Study Variables

The majority of the participants were women (80.4%), and the mean age of the participants was 72.2±8.28 years old, with those aged 65 or older constituting 83.2%. Of the participants, 43.7% had no formal education, 56.7% were religious and 60.7 % were employed. 58.3% of the participants were married (had spouses) and 71.9% were living with their family members such as spouse or children. Most respondents (94.8%) were enrolled in the National Health Insurance. Comorbid chronic diseases included hypertension (51.1%), diabetes (18.9%), and cardiovascular disease (12.6%). Fifty seven percent visited medical clinics for symptomatic osteoarthritis once or more during the past 6 months (Table1).

Regarding health status, the mean scores were; joint pain, 10.6±5.89, physical function, 5.5±3.56, depression, 19.3±10.01. The mean score of patient activation was 56.0±16.61 and 55.2% of the participants were at a low level of patient activation, while 44.8% were at a high level of activation (Table 1).

2. Differences in Patient Activation Level by General Characteristics and Health Status

There were statistically significant differences in pa-

Table 1. Descriptive Statistics of Study Variables (N=270)

Variables			n (%)	M±SD	Range
General characteristics	Gender	Male	53 (19.6)		
		Female	217 (80.4)		
	Age (year)	≤64	46 (17.0)	72.2±8.28	40~89
		65~74	113 (41.9)		
		≥75	111 (41.3)		
	Education	No formal education	118 (43.7)		
		Elementary school	110 (40.7)		
		≥Middle school	42 (15.6)		
	Religion	Yes	153 (56.7)		
		No	117 (43.3)		
	Occupation	Yes	164 (60.7)		
		No	106 (39.3)		
	Marital status[†]	Spouse (yes)	155 (58.3)		
		Bereaved/single	111 (41.7)		
	Living with family	Yes	194 (71.9)		
		No	76 (28.1)		
	Health insurance	National health insurance	256 (94.8)		
		Medical aid	14 (5.2)		
	Comorbidities	Hypertension			
		Yes	138 (51.1)		
		No	132 (48.9)		
		Diabetes			
		Yes	51 (18.9)		
		No	219 (81.1)		
		Cardiovascular disease	34 (12.6)		
		Yes	236 (87.4)		
		No			
	Use of medical clinics (one or more visit)	Yes	154 (57.0)		
		No	116 (44.1)		
Health status	Joint pain			10.6±5.89	0~28
	Physical function			5.5±3.56	0~20
	Depression			19.3±10.01	2~45
Patient activation		Low	149 (55.2)	56.0±16.61	21~100
		High	121 (44.8)		

[†] Excluded missing data.

tient activation level by age, education, religion, use of medical clinics, and depression (Table 2). Patients aged under 64 years of age were more likely to have a high level of activation compared with patients aged 65 to 74 years and 75 years or older (x^2=18.22, $p<.001$). For education, patients with middle school graduation or over were more likely to have a high level of patient activation compared to patients with no formal education or only elementary graduates (x^2=26.99, $p<.001$). Patients with religious beliefs were more likely to have a high level of activation compared to patients with no religious beliefs (x^2=6.02, $p=.014$). Patients who had not been seen in medical clinics at least once or more during the past 6 months were more likely to have a high level of activation compared with patients who had been seen in medical clinics in the past 6 months (x^2=8.82, $p=.003$).

OA patients who had higher score of depression tended to be the least activated (t=3.45, p=.005).

3. Factors associated with Patient Activation Level

Multivariate logistic regression analysis including all independent variables was conducted to determine which variables were predictors of patient activation level (Table 3). In the model, the significant predictors

of patient activation level were education, religion, comorbid hypertension, use of medical clinics, and depression. Elementary school graduates and middle school graduates were 1.96 times (95% CI=1.02~3.75) and 6.91 times (95%, CI=2.55~18.75) respectively more likely to belong to the high level of activation group than those with no formal education. OA patients with a religious beliefs were 1.85 times (95% CI=1.04~3.32) more likely to belong to the high level of activation group than

Table 2. Differences in Patient Activation Level by General Characteristics and Health Status (N=270)

Variables	Characteristics	Categories	Low level n (%) or M±SD	High level n (%) or M±SD	x^2 or t	p
General characteristics	Gender	Male Female	29 (19.5) 120 (80.5)	24 (19.8) 97 (80.2)	0.01	.939
	Age (year)	≤64 65~74 ≥75	16 (10.7) 56 (37.6) 77 (51.7)	30 (24.8) 57 (47.1) 34 (28.1)	18.22	<.001
	Education	No formal education Elementary school ≥Middle school	82 (55.0) 57 (38.3) 10 (6.7)	36 (29.8) 53 (43.8) 32 (26.4)	26.99	<.001
	Religion	Yes No	74 (49.7) 75 (50.3)	79 (65.3) 42 (34.7)	6.02	.014
	Occupation	Yes No	91 (61.1) 58 (38.9)	73 (60.3) 48 (39.7)	0.02	.901
	Marital status[†]	Married Bereaved/single	79 (54.5) 66 (46.5)	76 (62.8) 45 (37.2)	1.55	.213
	Living with family	Yes No	105 (70.5) 44 (29.5)	89 (73.6) 32 (26.4)	0.18	.589
	Health insurance	National health insurance Medical aid	142 (95.3) 7 (4.7)	114 (94.2) 7 (5.8)	0.02	.902

	Comorbidities	Hypertension
		  Yes
		  No
			
			84 (56.4)
			65 (43.6)
				
				54 (44.6)
				67 (55.4)
					3.23	.072

		Diabetes
		  Yes
		  No
			
			26 (17.4)
			123 (82.6)
				
				25 (20.7)
				96 (79.3)
					0.26	.607

		Cardiovascular disease
		  Yes
		  No
			
			21 (14.1)
			128 (85.9)
				
				13 (10.7)
				108 (89.3)
					0.41	.522

	Use of medical clinics (one or more visit)	Yes No	97 (65.1) 52 (34.9)	57 (47.1) 64 (52.9)	8.82	.003
Health status	Joint pain		10.9±5.92	10.1±5.83	1.19	.235
	Physical function		5.9±3.25	5.1±3.93	1.72	.087
	Depression		20.9±9.84	17.4±9.94	3.45	.005

[†] Excluded missing data.

those with no religious beliefs. OA patients with no co-morbid hypertension were 1.88 times (95% CI=0.30~0.95) more likely to belong to thehigh level of activation group than those with comorbid hypertension. OA patients with no medical clinic use were 2.27 times (95% CI=0.25~0.77) more likely to belong to the high level of activation group than OA patients using medical clinics once or more during the past 6 months.

OA patients with a lower score for depression were 1.04 times (95% CI=0.93~0.99) more likely to belong to the high level of activation group than those with a higher score for depression. Joint pain and physical function among variables of health status were not significantly associated with patient activation level. The Nagelkerke R^2 value was 0.274 suggesting that the model has predictive ability for patient activation level. There was no multicollinearity among independent variables (tolerance, .304~.971; variance inflation factor, 1.030~3.267).

Table 3. Factors associated with Patient Activation Level (*N*=270)

Variables	Characteristics	Categories	OR	95% CI	*p*
General characteristics	Gender	Male (ref.)			
		Female	0.87	0.39~1.93	.737
	Age (year)	≤64			
		65~74	0.93	0.39~2.21	.876
		≥75	0.49	0.86~1.32	.160
	Education	No formal education (ref.)			
		Elementary school	1.96	1.02~3.75	.042
		≥Middle school	6.91	2.55~18.75	<.001
	Religion	No (ref.)			
		Yes	1.85	1.04~3.32	.038
	Occupation	No (ref.)			
		Yes	0.62	0.31~1.20	.156
	Marital status	Married (ref.)			
		Bereaved/single	1.02	0.41~2.50	.970
	Living with family	No (ref.)			
		Yes	1.48	0.62~3.55	.374
	Health insurance	NHI (ref.)			
		Medical aid	0.96	0.25~3.64	.953
	Comorbidities	Hypertension			
		No (ref.)			
		Yes	0.53	0.30~0.95	.032
		Diabetes			
		No (ref.)			
		Yes	1.47	0.72~3.02	.289
		Cardiovascular disease			
		No (ref.)			
		Yes	0.74	0.32~1.75	.498
	Use of medical clinics (one or more visit)		0.44	0.25~0.77	.004
Health status	Joint pain		1.02	0.95~1.08	.642
	Physical function		0.99	0.90~1.11	.979
	Depression		0.96	0.93~0.99	.040
Model fit	-2Log likelihood=305.62, x^2=60.97 (*p*<.001), Cox & Snell R^2=.205, Nagelkerke R^2=.274				

ref.=reference; OR=Odds ratio; CI=Confidence interval.

DISCUSSION

The results show that the mean score for patient activation was 56.0±16.61, which is similar to that of patients (average age of 61.9 years) with chronic conditions (56.8±10.00)[8], but lower than that of patients with diabetes (mean=62.7)[23] (average age of 62 years) and chronic conditions (mean=64.2) (age of 18 years over)[12]. The possible reasons for the difference of patient activation in the current study may due to the age of the participants, older compared to those of previous studies or due to cultural differences or differences in the healthcare system.

Current study results indicate that patient activation is significantly associated with depression among variables of health status and general characteristics such as education, religion, comorbid hypertension, and use of medical clinics. Regarding general characteristics, patients with higher educational attainment were much more likely to have a higher level of patient activation for SM than counterparts, a finding consistent with a previous study[7]. Patients' educational background may be an important factor for nurses to assess and design for the strategies to enhance patient activation for SM. In the current study, patients with religious beliefs were more likely to have a high level of activation compared to patients with no religious beliefs. No research was found to support this result. Previous studies showed religious beliefs promote positive health behaviors or health care utilization[24,25], and patient activation is related to health behaviors or health outcomes[7-11]. So it could be guessed indirectly that religious beliefs may promote positive health behaviors or health care utilization through patient activation. Further studies need to confirm associations between patient activation and religious beliefs. The presence of comorbid hypertension in the current study was associated with a lower level of patient activation, whereas diabetes and cardiovascular diseases were unrelated. Previous studies have reported that people with multiple chronic diseases tended to have lower activation scores compared to adults with a single chronic condition or without comorbidity[12,26]. As the presence of comorbidities within the osteoarthritis patient population negatively impacts both physical functioning and pain, more aggressive teaching of self-management skills is needed for osteoarthritis patients with comorbidities[12]. Further study is required to ascertain the relationship between patient activation for SM and comorbidities in this population. And the results of this study show that people using medical clinics at least once or more for treatment of their symptomatic OA during past 6 months, had lower patient activation. This finding may be due to patients' dependency on doctors or preference to get a prescription from a clinic rather than self-manage their disease. A similar finding from previous study was that patients with higher activation levels made fewer emergency department visits[23]. Age and gender were also not related to patient activation, which is inconsistent with previous studies reporting differences in patient activation level by age and gender[8,13]. A skewed distribution of gender and age in the current sample: 85.2% of the participants were 65 years or older adults and 80.4% of the participants were women may explain the differences.

Among variables of health status, depression was associated with patient activation level among patients with OA, consistent with findings for chronic conditions such as diabetes and hypertension[11,27]. PAM modified for use in patients with mental health conditions (PAM-MH) has shown that higher activation was associated with greater recovery from mental health problems[28]. Depression is common among people with painful osteoarthritis and concomitant depression is associated with greater pain and disability among people with painful osteoarthritis[29]. Depressed patients with OA may be less likely to enhance activation and to participate in their self-management behaviors. Nurses should develop strategies to reduce depressive symptoms in patients with OA, which in turn could increase patient activation levels. Unexpectedly, patient activation level was unrelated to joint pain and physical function in the multivariate logistic analyses. This result may indicate that patient activation level may not directly influence joint pain and physical function, but influence them indirectly through health behaviors[30]. Further research is needed to understand the relationship between patient activation level and health status such as joint pain and physical function for these patients.

Some limitations of this study should be noted. First, the study was cross-sectional., thus causal relationship between variables is not clear indicating a need for experimental or longitudinal studies to examine changes in relationships among variables over time. This type of study would help to more clearly define directionality. There is also a limitation in generalizing the findings as the sample was not representative of all patients with OA, but only participants living in the community.

CONCLUSION

The current study investigated factors associated with patient activation for SM among community residents with OA using survey data. The study results revealed that depression and general characteristics such as education, religion, comorbid hypertension, and use of medical clinics were significantly associated with patient activation for SM. These findings provide insights and valuable information in assessing and designing effective intervention programs, and these significant variables could be employed in targeting population intervention, and in developing messages tailored to the characteristics of the clients with OA. To our knowledge, this is the first study on patient activation in Korean patients with OA. Therefore repetitive studies to confirm factors associated with patient activation for SM are suggested and evidence about patient activation from populations living with other chronic diseases need to extend. Further studies to improve health status or health outcomes through enhanced patient activation for SM among patients with osteoarthritis are needed.

REFERENCES

1. World Health Organization . Chronic rheumatic conditions [Internet]. Geneva: WHO. 2013 [cited 2015 August 1] Available from: http://www.who.int/chp/topics/rheumatic/en/

2. Ministry of Health and Welfare · Korean Center for Disease Control and Prevention. Korea health statistics 2013: Korea National Health and Nutrition Examination Survey (KNHANES VI-1). Seoul: Korea Centers for Disease control and Prevention Korea 2014 December. Report No:11-1351159-000027-10.

3. Robbins L, Kulesa MG. The state of the science in the prevention and management of osteoarthritis. American Journal of Nursing. 2012;112(3):25-33.
http://dx.doi.org/10.1097/01.NAJ.0000412636.55398.06

4. American Academy of Orthopedic Surgeons. Treatment of osteoarthritis of the knee: Evidence-based guideline 2nd ed. Rosemont IL: American Academy of Orthopedic Surgeons 2013. 1200 p.

5. Donald M, Ware RS, Ozolins IZ, Begum N, Crowther R, Bain C. The role of patient activation in frequent attendance at primary care: Apopulation-based study of people with chronic disease. Patient Education and Counseling. 2011;83(2):217-221.

6. Hibbard JH, Mahoney ER, Stockard J, Tusler M. Development and testing of a short form of the patient activation measure. Health Services Research. 2005;40(6 p1):1918-1930.
http://dx.doi.org/10.1111/j.1475-6773.2005.00438.x

7. Hendriks M, Rademakers J. Relationships between patient activation, disease-specific knowledge and health outcomes among people with diabetes: A survey study. BioMedCentral Health Services Research. 2014;14(1):393-401.
http://dx.doi.org/10.1186/1472-6963-14-393

8. Mosen DM, Schmittdiel J, Hibbard J, SobelD, Remmers C, Bellows J. Is patient activation associated with outcomes of care for adults with chronic conditions? Journal of Ambulatory Care Management. 200730(1):21-29.

9. Remmers C, Hibbard J, Mosen DM, Wagenfield M, Hoye RE, Jones C. Is patient activation associated with future health outcomes and healthcare utilization among patients with diabetes? Journal of Ambulatory Care Management. 2009;32 (4):320-327. http://dx.doi.org/10.1097/JAC.0b013e3181ba6e77

10. Greene J, Hibbard JH. Why does patient activation matter? An examination of therelationships between patient activation and health-related outcomes. Journal of General Internal Medicine. 2012;27(5):520-526.
http://dx.doi.org/10.1007/s11606-011-1931-2

11. Gerber LM, Barron Y, Mongoven J, McDonald M, Henriquez E, Andreopoulos E, et al. Activation among chronically ill older adults with complex medical needs: Challenges to supporting effective self-management. Journal of Ambulatory Care Management. 2011;34(3):292-303.
http://dx.doi.org/10.1097/JAC.0b013e31821c63b1

12. Hibbard JH, Cunningham PJ. How engaged are consumers in their health and health care, and why does it matter? Research Briefs. 2008;8:1-10.

13. Lubetkin EI, Lu W, Gold MR. Levels and correlates of patient activation in health center settings: Building strategies for improving health outcomes. Journal of Health Care for the Poor and Underserved. 2010;21(3):796-808.
http://dx.doi.org/10.1353/hpu.0.0350

14. Kawi J. Self-management and self-management support on functional ablement in chronic low back pain. Pain Management Nursing. 2014;15(1):41-50.
http://dx.doi.org/10.1016/j.pmn.2012.05.001

15. Cheon EY. The effects of a self-management program on physical function and quality of life of patients with knee osteoarthritis. Journal of Korean Academy of Nursing. 2005;35 (3):514-525.

16. Jeong YH, Kim JI. Effects of a 9-week self-help management . aquaticexercise program on pain, flexibility, balance, fatigue and self-efficacy in the patients with osteoarthritis. Journal of Muscle and Joint Health. 2010;17(1):47-57.

17. Ahn YH, Yi CH, Ham OK, Kim BJ. Psychometric properties of the Korean version of the "Patient Activation Measure 13" (PAM13-K) in patients with osteoarthritis. Evaluation & the Health Professions. 2015;38(2):255-264.
http://dx.doi.org/10.1177/0163278714540915

18. Bae SC, Lee HS, Yun HR, Kim TH, Yoo DH, Kim SY. Cross-

cultural adaptation and validation of Korean Western Ontario and McMaster Universities (WOMAC) and Lequesne osteoarthritis indices for clinical research. Osteoarthritis Cartilage. 2001;9(8):746-750. http://dx.doi.org/10.1053/joca.2001.0471

19. Song R, Lee EO, Lam P, Bae SC. Effects of tai chi exercise on pain, balance, muscle strength, and perceived difficulties in physical functioning in older women with osteoarthritis: A randomized clinical trial. The Journal of Rheumatology. 2003; 30(9):2039-2044.

20. Lorig KR, Sobel DS, Ritter PL, Laurent D, Hobbs M. Effect of a self-management program on patients with chronic disease. Effective Clinical Practice. 2001;4(6):256-262.

21. Cho MJ, Kim GH. Diagnostic validity of the CES-D (Korean Version) in the assessment of DSM-III-R major depression. Journal of the Korean Neuropsychiatric. 1993;32(3):381-399.

22. Seo BN, Ham YL, Ahn YH . A study on the relationship between level of pain and depression in middle-aged women with chronic low back pain. Journal of Muscle and Joint Health. 2007;14(2):118-126.

23. Begum N, Donald M, Ozolins IZ, Dower J. Hospital admissions, emergency department utilization and patient activation for self-management among people with diabetes. Diabetes Research and Clinical Practice. 2011;93(2):260-267. http://dx.doi.org/10.1016/j.diabres.2011.05.031

24. Allen JD, Leyva B, Torres MI, Ospino H, Tom L, Rustan S, et al. Religious beliefs and cancer screening behaviors among Catholic Latinos: Implications for faith-based interventions. Journal of Health Care for the Poor and Underserved. 2014; 25(2):503-526. http://dx.doi.org/10.1353/hpu.2014.0080

25. Holt CL, Clark EM, Roth DL. Positive and negative religious beliefs explaining the religion-health connection among African Americans. The International Journal for the Psychology of Religion. 2014;24(4):311-331. http://dx.doi.org/10.1080/10508619.2013.828993

26. Smith SG, Pandit A, Rush SR, Wolf MS, Simon C. The association between patient activation and accessing online health information: Results from a national survey of US adults. Health Expectations. 2014. Forthcoming. http://dx.doi.org/10.1111/hex.12316

27. Magnezi R, Glasser S, Shalev H, Sheiber A,Reuveni H. Patient activation, depression and quality of life. Patient Education and Counseling. 2014;94(3):432-437. http://dx.doi.org/10.1016/j.pec.2013.10.015

28. Green CA, Perrin NA, Polen MR, Leo MC, Hibbard JH, Tusle, M. Development of the patient activation measure for mental health. Adminstration and Policy in Mental Health. 2010;37 (4):327-333. http://dx.doi.org/10.1007/s10488-009-0239-6

29. Gleicher Y, Croxford R, Hochman J, Hawker G. A prospective study of mental health care for comorbid depressed mood in older adults with painful osteoarthritis. BMC Psychiatry. 2011; 11:147-156. http://dx.doi.org/ 10.1186/1471-244X-11-147

30. Hibbard JH, Greene J, Becker ER, Roblin DW, Painter MW, Perez DJ, et al. Racial/ethnic disparities and consumer activation in health. Health Affairs. 2008;27(5):1442-1453. http://dx.doi.org/10.1377/hlthaff.27.5.1442