[Downloaded free from http://www.advbiores.net on Monday, February 20, 2023, IP: 178.173.134.149]

Original Article

Relationship between Self-efficacy and Physical Activity, Medication Adherence in Chronic Disease Patients

Seyde Shahrbanoo Daniali, Firooze Mostafavi Darani[1], Ahmad Ali Eslami[1], Mohammad Mazaheri[2]

From the Department of Health, Student Research Center, School of Health, [1]Department of Health Education and Promotion, School of Health, [2]Department of Traditional Medicine, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

Abstract

Background: The global epidemic of unhealthy lifestyle causes to increase chronic disease. It has been proven that psychological factors such as self-efficacy are responsible to success in the process of lifestyle change. Low self-efficacy is usually related to low level of physical activity and medication adherence. Objective of the study was to investigate the effects of self-efficacy, other physical symptoms on physical activity and medication adherence in patients with chronic illness in public health centers. **Materials and Methods:** A cross-sectional study was conducted on 483 patients with chronic diseases attended to governmental health care centers in Isfahan. Participants were chosen by systematic random sampling. Inclusion criteria were having a chronic illness at least 6-month ago while prescription of medication and willing to take part in the survey. The parts of Stanford Self-management Questionnaire were used. Data were analyzed by SPSS 18 software using the descriptive and analytic statistics. $P < 0.05$ was considered significant. **Results:** Mean age of participants was 54.8 (7.22) years. The half of participants had low self-efficacy and 87.2% had low physical activity. Nearly 80% of patients had a good medication adherence. There was a significant relationship between self-efficacy and physical activity ($P = 0.336$, $\beta = 1.01$, $P < 0.001$). **Conclusion:** Although chronic disease patients had a good medication adherence, other self-care behaviors such as physical activity has been neglected. It is seemed that concentration on psychological factors such as self-efficacy should be considered as a proximal factor to improve self-care.

Keywords: *Chronic disease, medication adherence, middle-aged, physical activity, self-efficacy*

Introduction

The global epidemic of unhealthy lifestyles, urbanization, industrialization, increased life expectancy has led to increase chronic disease as a public health problem.[1] Today, noncommunicable diseases handle two-third of total mortality in all over the world.[2] Eighty percent of these deaths occur in poor- or middle-income countries[1] and the burden of them will be increased to 57% by 2020.[3]

Today, it is established that changes in lifestyle, besides medication treatment is crucial factor to a better prognosis. For example, healthy eating, increased physical activity, and weight management can decrease the prevalence and progress of the mentioned diseases.[3]

However, healthy lifestyle is complicated and variety of barriers interferes with it. It has been proven that psychological factors such as self-efficacy is responsible for success in the process of lifestyle change, and can be noticed as an effective mechanism to health promotion in chronic illness.[4] In fact, the intention-behavior gap can be compensated by attention to the psychological factors.[5] Self-efficacy is known as "the beliefs in the ability to take successfully action and perform a specific task or having the confidence and ability to change a behavior." People with low self-efficacy were easily faced to the problems, whereas those with a high level of self-efficacy, do their best to improve skills and overcome the obstacles.[6]

A lot of evidence has shown, increasing the level of confidence associated with effective self-management.[7] Inversely, low self-efficacy is usually related to a low level of physical activity,[8] and medication.[9]

For decades, physical activity and its advantages have been emphasized especially in chronic diseases because it has followed a substantial reduction in risk and complications of long-term illnesses among

Address for correspondence:
Dr. Ahmad Ali Eslami, Department of Health Education and Promotion, School of Health, Isfahan University of Medical Sciences, Isfahan, Iran.
E-mail: eslamiaa@gmail.com

Access this article online

Website: www.advbiores.net

DOI: 10.4103/2277-9175.190997

Quick Response Code:

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Daniali SS, Darani FM, Eslami AA, Mazaheri M. Relationship between Self-efficacy and Physical Activity, Medication Adherence in Chronic Disease Patients. Adv Biomed Res 2017;6:63.

Received: October, 2015. **Accepted:** November, 2015.

[Downloaded free from http://www.advbiores.net on Monday, February 20, 2023, IP: 178.173.134.149]

middle-aged patients.[10] Even Blair believed that measuring of fitness should be considered as the same as medical examination to predict the mortality risk among patients.[11]

On the other hand, different factors tend to not take medications instructions well. The medication adherence among long-term illness is not satisfactory.[12] According to the result of studies, the rate of non-adherence to medications has reported differently from 18% to 50%.[13-15]

Objective

The growth of chronic diseases and poor self-care (sedentary lifestyle, non-medication adherence) in Iran[16-18] and change of them as an effective strategy in these patients is established. We intended to investigate the prevalence and the effect of self-efficacy on inactivity, non-adherence medication. In addition, the effects of physical symptoms' and family support on these behaviors were examined among patients with chronic illness in governmental healthcare centers in Isfahan city (Iran).

Materials and Methods

The present study was a cross-sectional study. The statistical population of this study included every kind of chronic disease patients that had attended in governmental healthcare centers in Isfahan city (Iran). These patients were middle-aged or elder and other registered patients with chronic disease. Based on the national care protocols, their health history was recorded in the health records and the presence of the disease approved by the physician's centers to receive cure and care services. According to Cochrane formula by considering of the confidence interval (0.95) and probability (0.5), the error level of 0.04, the sample size was 496. Samples were selected based on two-stage random clustering method. There were 48 daily urban governmental healthcare centers in Isfahan city. Ten of them were selected randomly. Participants were selected according to systematical random method. Because of the difference between the frequency of under covered population in each center, between 25 and 50 patients having inclusion criteria to participate in the study were chosen. Inclusion criteria were as follow: (1) Having a chronic illness at least 6-month ago and prescription of medication (2) willing to take part in the survey (3) lack of ability to walk. Exclusion criteria were (1) contradictory answers caused by the elderly problems and (2) the distorted questionnaire, so that 13 patients were excluded from the study.

After the ethical approval has been obtained from research assistant of Isfahan University of Medical Sciences, Ethics Committee (reference: 393790.10/9/1393), and coordinating the related units and obtaining necessary permissions, informed consent forms were filled out by patients. Patients were assured that the questionnaires were anonymous and number and type of disease would be held confidential. Questionnaires were completed interviewing from March 2015 to June 2015 by interviewing in a quiet room (the most of the patients were not adequately literate to complete questionnaires. Some of them had the vision problems and could not fill out the questionnaires). To avoid bias in filling out the questionnaires, all of the interviews were conducted by one trained questioner exclusively.

Study analysis was conducted to measure contextual and demographic characteristics including age, marital status, sex, education, weight and height, type of disease (diabetes, hypertension, heart disease, osteoporosis, arthritis, hypothyroidism, and renal disease), and duration of illness. The weight and height were measured with a standard scale by one trained interviewer. Their weight was recorded in the scale of kilogram and measured using a weight capacity pre calibrated digital scale. Participants were weighed without their shoes. Their height was obtained by taking the average of two readings of height in meters using a portable stadiometer. Body mass index was determined by dividing weight (kg) by height square (m^2).

For using the different parts of English translated questionnaire (Stanford Self-management Questionnaire in chronic disease patients), we did through the translation-back-translation process. Accordingly, we invited 10 experts (physucion, health educator, and nurse) to assess the face and content validity index. We revised the Farsi version of the questionnaire according to their comments. Then, we administered the scale to 30 patients with at least one chronic disease and assess the reliability coefficient of total scale ($\alpha = 0.79$).

The self-efficacy tool was a standard questionnaire named Self-efficacy for Managing Chronic Disease 6-Item Scale. It contains 6 items with a 10-step Likert scale ranged from 1 "not at all confident" to 10 "totally confident." The higher scores in comparing mean self-efficacy score was taken high self-efficacy and reversely. In this questionnaire, the level of confidence to fatigue, pain, the emotional distress, any other control symptoms, and actions to control illness were stated. The internal consistency was reported 0.77–0.92.[19,20] To obtain the level of physical activity, the Stanford Self-management Questionnaire was used. Physical activity scale contains 6 items about the stretching exercise, walking, swimming, use of sports equipment, and other aerobic exercise in past week (that explained to participants) and minutes of exercise during 1 week included; never, <30, 30–60, 60–180, more than 180 min with 0–4 scores, respectively. Participants who scored 3–4 coded as adhering to walking recommendations.[20] The test-retest correlation for the physical activities scale was 0.42–0.92.[21]

Medication adherence was measured by 4-item questionnaire. These questions is related to forgiveness, suspicion of drug use discontinuation due to healing or worsen of general health during 2 past weeks. The score of item was based on yes (1) or no (0).[22]

[Downloaded free from http://www.advbiores.net on Monday, February 20, 2023, IP: 178.173.134.149]

Visual analog pain scale is a numeric scale to assess pain intensity that its internal consistency was 0.86 and among patients with a kind of chronic illness.[19]

Visual analog fatigue (stress) scale is a numeric fatigue scale to assess fatigue (stress) intensity, i.e., a modified version of the visual analog scale and also easy to use.[23]

Family support is evaluated with 2 self-administered questions regarding to encourage and accompany by family membership in performing better self-care behaviors.

Data were analyzed by a software package used for statistical analysis SPSS-16 statistical software (SPSS Inc., Chicago, Illinois) for IBM RS6000 work-station (IBM Corporation, Armonk, New York). Descriptive analysis (median) was used for frequency distribution of data. Spearman correlation coefficient was implemented to determine the relationship of self-efficacy with physical activity, medication adherence, family support, and physical symptoms such as pain, stress, insomnia, and fatigue. Binary logistic regression was used into account confounding variables to explore the relationship between self-efficacy and physical activity. We measured the difference between the self-efficacy, physical activity and medication adherence in terms of the kind of disease by Chi-square test. *T*-test (Mann–Whitney U-test) was performed to analyses physical activity, medication adherence, and self-efficacy differences between men and women. $P < 0.05$ was considered significant.

Results

Participants ranged in age from 30 to 76 years, with a mean of 55.15 (7.21) years old. Over half of them were 50 aged or above. Duration of disease was between 6 months and 45 years. They were suffering from a mean of 8 years from 1 to 6 chronic illness. Two-third of the participants was approximately suffered from more than one chronic disease. Nearly 40.4% had been used anti-hyperlipidemia drags. In terms of other contextual characteristic, two-third of patients evaluated their economic conditions as moderate. Almost, 96% of the subjects were living with two others of their family (husband or children), whereas only 28.8% believed that one of their family members had a positive or supportive role to control of their illness. Other demographic characteristics were reported in Table 1.

The mean score of self-efficacy was 5.75 (2.26) in patients. Nearly half of participants had good self-efficacy to control of their chronic illness [Table 2]. The most participants (80.6%) had a high confidence to carry out medication and other medical tests and 50% of participants had the sufficient confidence to control their pain, and sorrow or fatigue (according to items of self-efficacy scale). Paired *t*-test showed a significant difference between the self-efficacy score based on sex, so that men have a higher self-efficacy than women ($P = 0.01$).

Mean score of physical activity was very low. In comparison with the women, men showed a higher physical activity (2.11 [2.3], 3.45 [3.2], respectively) $P < 0.001$.

Generally, the majority of the current participants, had <30 min/week [Table 2]. The most physical activity was

Table 1: The frequency of demographic and contextual characteristic among participants

Variable	*n* (%)
Sex	
Female	433 (85.3)
Male	71 (14.7)
BMI group (kg/m^2)	
18.5-24.99	51 (10.6)
25-29.99	226 (46.8)
<30	206 (42.7)
Education	
Illiterate	176 (36.4)
Under 12 years graduated	233 (48.2)
12 years graduated	58 (12)
Academic literacy	16 (3.3)
Marital status	
Single	2 (0.4)
Married	432 (89.4)
Divorced	2 (0.4)
Widow	47 (9.7)
Name of disease*	
Hypertension	359 (74.3)
Diabetes	283 (56.6)
Osteoporosis	144 (29.8)
Heart disease	124 (25.7)
Renal disease	73 (15.1)
Arthritis rheumatoid	36 (7.9)
Others (asthma, hypothyroidism, MS, migraine, low back pain, …)	133 (25.9)

*Patients had 2 or more comorbidities. MS: Multiple sclerosis, BMI: Body mass index

Table 2: The frequency (percentage) of classified self-efficacy, physical activity and medication adherence among participants

Variables	Frequency (%)
Self-efficacy	
Low self-efficacy (< mean)	211 (43.7)
High self-efficacy (≥ mean)	272 (56.3)
Physical activity	
Low physical activity (≤2)	421 (87.2)
High physical activity (>2)	62 (12.8)
Medication adherence	
Forgiveness of medication	108 (22.4)
Doubt to take medication	102 (21.1)
Disruption of medication because of healing	38 (7.9)
Disruption of medication because of Deterioration of general condition because of medication	30 (6.2)

[Downloaded free from http://www.advbiores.net on Monday, February 20, 2023, IP: 178.173.134.149]

walking (asked them walking as a physical activity not as a leisure time). Only 30.8% of participants walked at least 10–26 min daily as a sport. Approximately, 15.6% had walked at least 4–9 min daily. Most of the participants (53.6%) had not walked never daily. The level of other exercises such as stretching exercise, swimming, or exercise equipment was very low too (1–6%). Mann–Whitney U-test showed men had more physical activity than women ($P < 0.001$).

Among items of the medication adherence questionnaire, 78.4% of patients had a good medication adherence. Forgiveness of medication was the most cause of non-adherence. The mean score of fatigue and stress in these participants was higher than average amount [Table 2]. Mann–Whitney U-test showed no difference between medication adherence score between two sex.

On the other, the different percent of physical activity, self-efficacy, and medication adherence distribution in terms of the kind of chronic illness was reported in Figure 1.

There was the most negative correlation between self-efficacy and fatigue ($\rho = -0.416$, $P < 0.001$) and the least correlation related to self-efficacy and medication adherence ($\rho = 0.091$, $P < 0.01$). Other coefficients correlation between self-efficacy, physical symptoms, and medication adherence have showed in Table 3.

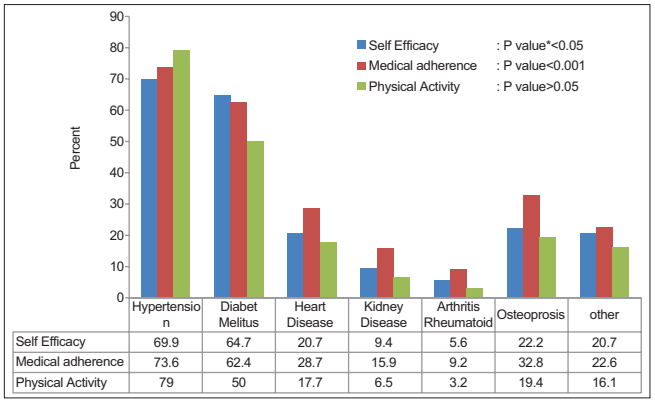
Binary logistic regression (backward method) showed in spite of a significant coefficient between family support and physical activity ($\rho = 0.09$, $P < 0.05$), only sex ($\beta = 1.046$), self-efficacy ($\beta = 1.01$), and fatigue ($\beta = -0.091$), were significantly correlated with physical activity. These variables explained 86.7% of the variance of physical activity [Table 4].

Discussions

The current study was a cross-sectional research conducted on 483 patients with chronic illness. Three percent of 496 excluded from the study because of being distortion of the questionnaire. This study was conducted in the governmental healthcare centers in Isfahan (Iran) from March 2015 to June 2015.

This study found that the half of participants had good self-efficacy to manage their chronic illness. The result of Warren-Findlow *et al*. is a little more (59%) comparing our study.[24] Men had higher self-efficacy than women. Results of current study is in contrary to Bas and Donmez study that has reported the better self-efficacy to weight control behavior among women.[25] This result may be attributed to the natural tendency and importance of keeping weight in women viewpoint. So that, they felt more confidence to weight control in comparison men. Culturally, men are more determined to solve problems upon on intrinsic power than women to self-management.

In the current study, the level of physical activity was very poor. In the current investigation, walking was a practical and fun exercise to change the sedentary lifestyle to health promotion that can be considered. Other exercises such as stretching exercise, swimming and exercise equipment were missed among the participants. Sedentary lifestyle or "not sufficient activity" in middle-aged patients was established in national and international studies, as well.[26-29] Our findings showed the very low levels of physical activity in women than in men, that is in line with Sarrafzadegan *et al*. in Iran.[30] It seems hours of household activities and family responsibilities besides other social and cultural barriers to physical activity make sedentary life in women. In the other,



	Hypertension	Diabet Melitus	Heart Disease	Kidney Disease	Arthritis Rheumatoid	Osteoprosis	other
Self Efficacy	69.9	64.7	20.7	9.4	5.6	22.2	20.7
Medical adherence	73.6	62.4	28.7	15.9	9.2	32.8	22.6
Physical Activity	79	50	17.7	6.5	3.2	19.4	16.1

Figure 1: Differences between self-efficacy, medication adherence, physical activity in terms of kind of chronic disease patients (*P* value was related to this difference among participants)

Table 3: Correlation coefficients between physical symptoms with self-efficacy, physical activity and medical adherence among chronic disease patients

	1	2	3	4	5	6	7
Fatigue	1						
Pain	0.52**	1					
Insomnia	0.27**	0.32**	1				
Stress	0.44**	0.40**	0.25**	1			
Physical activity	–0.31*	–0.25*	–0.02	–0.19*	1		
Medication adherence	–0.01	0.035	0.08	–0.06	0.05	1	
Self-efficacy	–0.38**	–0.41**	–0.24*	–0.343**	0.33**	0.09*	1
Median (range score)	8 (0-10)	5 (0-10)	4 (0-10)	8 (0-10)	2 (0-4)	0 (0-4)	6.28 (0-10)

*Significant in level <0.01, **Significant in level <0.001

[Downloaded free from http://www.advbiores.net on Monday, February 20, 2023, IP: 178.173.134.149]

Table 4: Binary logistic regression (backward Wald) between (predictors of physical activity)

Factors	*β*	SE	OR (CI 95%)	*P*
Sex	1.046	0.329	2.85 (1.50-5.42)	0.001
Self-efficacy	1.01	0.34	2.76 (1.39-5.46)	0.004
Fatigue	−0.091	0.039	0.91 (0.84-0.98)	0.019

Variable (s) after entrance of sex, age, fatigue, pain, insomnia, duration of disease, stress, number of disease, family support. SE: Standard deviation, CI: Confidence interval, OR: Odds ratio

they also tend to sacrifice their health for their family's requirements. Sniehotta *et al*. study is in line with our study, in the way that 61% of coronary heart disease had totally inactive in spite of medical recommendation to exercise.[5] Low level of physical activity in chronic illness has been reported too.[31] Reversely, Yi *et al*. reported that the physical activity was more even after stroke.[32] This difference may be related to the role of perceived risk as a strong motivator to healthy life in these patients.

In our study, 1/5 of participants had a poor medication adherence because of forgiveness or doubt to take medication. In national studies, the rate of adherence among patients with chronic disease has been reported between 12.7% and 86.3%.[33] This rate is between 50% and 80% in international studies.[34,35] It's seemed the prevalence of medication adherence is good in our study. Forgiveness of medication and doubt to take medication were the most factors related to non-medication adherence as well as Krousel-Wood *et al*. study.[35] The prevalence of low medication adherence scores did not differ according to sex. The result of Holt *et al*. is in line with current study too.[36]

In the current study, there was a positive relationship between self-efficacy and physical activity. The study of Bauman *et al*., Zhang *et al*., and Martin *et al*. are in line with our study.[5,37-39] In Sniehotta *et al*. study, self-efficacy, outcome expectancies, and risk awareness were accounted for 69% of the variance of physical activity among heart disease patients.[5]

In present study, there was no relationship between self-efficacy and medication adherence. The finding of Warren-Findlow is not in line with current study,[24] that may be caused of different sample (hypertensive women) and questionnaire. In the other, medication adherence is multidimensional phenomena and variety of factors interferes on it that in our study wasn't considered.

There was a negative significant relationship between physical symptoms such as stress and fatigue with physical activity. In chronic illness, the mutual effects of fatigue, stress, and physical inactivity has prone too.[31,40] The sorting out the long-term daily life problems related to disease induced a fatigue feeling as a known barrier of physical activity. Pain has been considered as a physical activity barrier in stroke survivors.[32,41] These after adjusting, they were not significant. It seemed the severity of pain in current patients compared to those studies was not too strong to interfere with physical activity.[25]

According to our finding, although most of the patients with long disease had not solitary life, it is supposed that they had no necessary support from their wives, husbands, or children. Other studies pointed to the low family support in diabetic patients.[42] The studies have found chronic illness causes uncertainty and can be very intrusive to individuals' life and produce the need of support. Other studies pointed to the low self-support in diabetic patients.[4] Its seemed, living with another person doesn't necessarily mean effective support, so it couldn't have an important role in adherence in current study; while, DiMatteo study showed living with another person enhance the adherence[43] that is recommended, it is examined in other studies. It is seemed that patient with chronic illness in our society, fight the disease lonely and other family members do not have collaborated effort to control of disease.

Conclusion

Although chronic disease patients had a good medication adherence, other self-care behaviors such as physical activity has been neglected. It is seemed that concentration on psychological factors such as self-efficacy should be considered as a proximal factor to improve self-care.

Recommendations

We can improve the general health of patients with the recommendation of walking and other self-care behaviors and training the patients, so that physical activity will be considered besides medication to success of control and good prognosis in chronic disease.

Advantages of this study

The large sample size, interview of all participants with one trained interviewer, and its design to use a less-used tool in Iranian chronic diseases patients in this survey was noticeable. Majority of studies related to self-management were focused on diabetic, hypertensive, or other chronic disease separately. Whereas the studied population included patients with different types of chronic disease.

The limitation of the study

Self-report of physical activity and medication adherence were the limitation of our study. This study investigates the behaviors of attended patients to the governmental public health centers and this result cannot be generalized to all chronic illness patients. The reluctance of male patients to participate is seen too.

Acknowledgment

Authors are very thankful to all patients for their contribution and other colleagues in health care centers to their support of this study.

[Downloaded free from http://www.advbiores.net on Monday, February 20, 2023, IP: 178.173.134.149]

Financial support and sponsorship

Research Deputy of Isfahan University of Medical Sciences.

Conflicts of interest

There are no conflicts of interest.

References

1. WHO. 10 Facts on Noncommunicable Diseases; 2014. Available from: http://www.who.int/features/factfiles/noncommunicable_diseases/facts/en/index2.html. [Last accessed on 2014 Nov 05].
2. Feng XL, Panga M, Beardb J. Health System Strengthening and Hypertension Awareness, Treatment and Control: Data from the China Health and Retirement Longitudinal Study: WHO; 2013. Available from: http://www.who.int/bulletin/volumes/92/1/13-124495/en/. [Last cited on 2013 Sep 10].
3. Chodzko-Zajko WJ. Exercise and Physical Activity for Older Adults; 2014. Available from: http://www.nutritionaustralia.org. [Last updated on 2015 Jun 07].
4. Lorig KR, Holman H. Self-management education: History, definition, outcomes, and mechanisms. Ann Behav Med 2003;26:1-7.
5. Sniehotta FF, Scholz U, Schwarzer R. Bridging the intention-behaviour gap: Planning, self-efficacy, and action control in the adoption and maintenance of physical exercise. Psychol Health 2005;20:143-60.
6. Bandura A. Health promotion by social cognitive means. Health Educ Behav 2004;31:143-64.
7. Park YH, Song M, Cho BL, Lim JY, Song W, Kim SH. The effects of an integrated health education and exercise program in community-dwelling older adults with hypertension: A randomized controlled trial. Patient Educ Couns 2011;82:133-7.
8. Prince SA, Reed JL, Nerenberg KA, Kristjansson EA, Hiremath S, Adamo KB, *et al.* Intrapersonal, social and physical environmental determinants of moderate-to-vigorous physical activity in working-age women: A systematic review protocol. Syst Rev 2014;3:132.
9. AlGhurair SA, Hughes CA, Simpson SH, Guirguis LM. A systematic review of patient self-reported barriers of adherence to antihypertensive medications using the World Health Organization multidimensional adherence model. J Clin Hypertens (Greenwich) 2012;14:877-86.
10. Beraki Å, Magnuson A, Särnblad S, Åman J, Samuelsson U. Increase in physical activity is associated with lower HbA1c levels in children and adolescents with type 1 diabetes: Results from a cross-sectional study based on the Swedish pediatric diabetes quality registry (SWEDIABKIDS). Diabetes Res Clin Pract 2014;105:119-25.
11. Blair SN. Physical inactivity: The biggest public health problem of the 21st century. Br J Sports Med 2009;43:1-2.
12. Gerbino G, Dimonte V, Albasi C, Lasorsa C, Vitale C, Marangella M. Adherence to therapy in patients on hemodialysis. G Ital Nefrol 2011;28:416-24.
13. Mohammadi A, Dadkhah B, Sezavar S, Mozaffari N. The effect of follow up on blood pressure control in hypertensive patients. J Ardabil Univ Med Sci Health Serv 2006;6:156-62.
14. DiMatteo MR. Variations in patients' adherence to medical recommendations: A quantitative review of 50 years of research. Med Care 2004;42:200-9.
15. Vervloet M, van Dijk L, Santen-Reestman J, van Vlijmen B, Bouvy ML, de Bakker DH. Improving medication adherence in diabetes type 2 patients through real time medication monitoring: A randomised controlled trial to evaluate the effect of monitoring patients' medication use combined with short message service (SMS) reminders. BMC Health Serv Res 2011;11:5.
16. Roudsari DM, Golchin MD, Haghani H. Relationship between adherence to therapeutic regimen and health related quality of life in hypertensive patients. Iran J Nurs 2013;26:44-54.
17. Ahmadipour H, Farajzadegan Z, Kachoei A, Pirdehghan A. Secondary prevention by enhancing adherence in diabetic patients. Int J Prev Med 2010;1:50-5.
18. Stoner L, Stoner KR, Young JM, Fryer S. Preventing a cardiovascular disease epidemic among Indigenous populations through lifestyle changes. Int J Prev Med 2012;3:230-40.
19. Lorig K, Drph KL, Stewart A, Ritter P, Gonzalez VM, Laurent D, *et al*. Outcome Measures for Health Education and Other Health Care Interventions. New York: Sage Publications; 1996.
20. Hordern MD, Dunstan DW, Prins JB, Baker MK, Singh MA, Coombes JS. Exercise prescription for patients with type 2 diabetes and pre-diabetes: A position statement from exercise and sport science Australia. J Sci Med Sport 2012;15:25-31.
21. González VM, Stewart A, Ritter PL, Lorig K. Translation and validation of arthritis outcome measures into Spanish. Arthritis Rheum 1995;38:1429-46.
22. Stanford, Patient, Education, Center R. Fatigue Visual Numeric Scale; 2015. Available from: http://www.patienteducation.stanford.edu/research/vnsfatigue.html. [Last cited on 2015 Oct 06].
23. Lorig K, Chastain RL, Ung E, Shoor S, Holman HR. Development and evaluation of a scale to measure perceived self-efficacy in people with arthritis. Arthritis Rheum 1989;32:37-44.
24. Warren-Findlow J, Seymour RB, Brunner Huber LR. The association between self-efficacy and hypertension self-care activities among African American adults. J Community Health 2012;37:15-24.
25. Bas M, Donmez S. Self-efficacy and restrained eating in relation to weight loss among overweight men and women in Turkey. Appetite 2009;52:209-16.
26. Mortazavi SS, Shati M, Ardebili HE, Mohammad K, Beni RD, Keshteli AH. Comparing the effects of group and home-based physical activity on mental health in the elderly. Int J Prev Med 2013;4:1282-9.
27. Kohl HW, Craig CL, Lambert EV, Inoue S, Alkandari JR, Leetongin G, *et al*. The pandemic of physical inactivity: Global action for public health. Lancet Glob Health 2012;380:294-305.
28. Hamilton MT, Healy GN, Dunstan DW, Zderic TW, Owen N. Too little exercise and too much sitting: Inactivity physiology and the need for new recommendations on sedentary behavior. Curr Cardiovasc Risk Rep 2008;2:292-8.
29. Rasooli F, Amiry PH, Mahmoodi M, Abdoli S. Assessment of the application for preventive factors of osteoporosis, in menopausal women referred to the health care centers in Tehran University of Medical Sciences. Hayat 2002;8:4-11.
30. Sarrafzadegan N, Kelishadi R, Baghaei A, Hussein Sadri G, Malekafzali H, Mohammadifard N, *et al.* Metabolic syndrome: An emerging public health problem in Iranian women: Isfahan healthy heart program. Int J Cardiol 2008;131:90-6.
31. Fritschi C, Quinn L. Fatigue in patients with diabetes: A review. J Psychosom Res 2010;69:33-41.
32. Yi TI, Han JS, Lee KE, Ha SA. Participation in leisure activity and exercise of chronic stroke survivors using community-based rehabilitation services in seongnam city. Ann Rehabil Med 2015;39:234-42.
33. Rafii F, Fatemi NS, Danielson E, Johansson CM,

[Downloaded free from http://www.advbiores.net on Monday, February 20, 2023, IP: 178.173.134.149]

Modanloo M. Compliance to treatment in patients with chronic illness: A concept exploration. Iran J Nurs Midwifery Res 2014;19:159-67.

34. DiMatteo MR, Lepper HS, Croghan TW. Depression is a risk factor for noncompliance with medical treatment: Meta-analysis of the effects of anxiety and depression on patient adherence. Arch Intern Med 2000;160:2101-7.
35. Krousel-Wood MA, Muntner P, Islam T, Morisky DE, Webber LS. Barriers to and determinants of medication adherence in hypertension management: Perspective of the cohort study of medication adherence among older adults. Med Clin North Am 2009;93:753-69.
36. Holt E, Joyce C, Dornelles A, Morisky D, Webber LS, Muntner P, *et al.* Sex differences in barriers to antihypertensive medication adherence: Findings from the cohort study of medication adherence among older adults. J Am Geriatr Soc 2013;61:558-64.
37. Martin MY, Person SD, Kratt P, Prayor-Patterson H, Kim Y, Salas M, *et al.* Relationship of health behavior theories with self-efficacy among insufficiently active hypertensive African-American women. Patient Educ Couns 2008;72:137-45.
38. Zhang KM, Dindoff K, Arnold JM, Lane J, Swartzman LC. What matters to patients with heart failure? The influence of non-health-related goals on patient adherence to self-care management. Patient Educ Couns 2015;98:927-34.
39. Bauman AE, Reis RS, Sallis JF, Wells JC, Loos RJ, Martin BW. Correlates of physical activity: Why are some people physically active and others not? Lancet Glob Health 2012;380:258-71.
40. Stults-Kolehmainen MA, Sinha R. The effects of stress on physical activity and exercise. Sports Med 2014;44:81-121.
41. Veenhof C, Huisman PA, Barten JA, Takken T, Pisters MF. Factors associated with physical activity in patients with osteoarthritis of the hip or knee: A systematic review. Osteoarthritis Cartilage 2012;20:6-12.
42. Adeniyi A, Idowu O, Ogwumike O, Adeniyi C. Comparative influence of self-efficacy, social support and perceived barriers on low physical activity development in patients with type 2 diabetes, hypertension or stroke. Ethiop J Health Sci 2012;22:113-9.
43. DiMatteo MR. Social support and patient adherence to medical treatment: A meta-analysis. Health Psychol 2004;23:207-18.