



International Journal of Pharmacology

ISSN 1811-7775

RESEARCH ARTICLE

OPEN ACCESS

DOI: 10.3923/ijp.2015.518.522

Impact of Mood Disorder on Medication Adherence in Patients with Chronic Diseases at a Shanghai Rural Hospital

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ARTICLE INFO

Article History:

Received: March 04, 2015

Accepted: May 11, 2015

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ABSTRACT

Few studies were conducted on risk factor in medication nonadherence in developing rural area in China. The goal of this study was to perform a survey to address the prevalence of medication nonadherence and the reasons for nonadherence. Outpatients with chronic diseases (chronic obstructive pulmonary disease, diabetes, hyperlipidemia, hypertension, etc) in a rural hospital far away from Shanghai downtown, from Jan 1 to June 30, 2014 were invited to participate in this survey. Patients were answered a combination questionnaire including self-reported medication adherence and depression/anxiety symptoms. A total of 325 patients with chronic diseases were treated with regular medication without any anti-anxiety drugs or antidepressants. The 255 (78.5%) patients were regarded as medication nonadherence. Age, gender, educational level, brand preference and health literacy were not associated with medication adherence, while the number of chronic diseases, anxiety and depression were negatively impact medication adherence. Depression and anxiety symptoms are possible risk factors causing the nonadherence.

Key words: Medication adherence, chronic disease, rural hospital, depression, anxiety

INTRODUCTION

Medication adherence usually refers to whether patients take their medications as prescribed (e.g., twice daily), as well as whether they continue to take a prescribed medication. Medication nonadherence is a growing concern to clinicians, healthcare systems and other stakeholders (e.g., payers). Its prevalence was associated with adverse outcomes and higher costs of care and has been recognized as a barrier to achieve better outcomes for patients (Osterberg and Blaschke, 2005). In general, medication nonadherence rates range from around 30-70% among patients with chronic diseases (Briesacher *et al.*, 2008; Jackevicius *et al.*, 2002; Lee *et al.*, 2006).

Evidences documented that many factors including complex medication regimen, multi-drugs treatment, old-age, unawareness of health status, doubt about medication benefit and so forth are associated with medication nonadherence (Lacro *et al.*, 2002; Cao *et al.*, 2011; Shrank *et al.*, 2006). Currently, brand preference and health literacy are interesting

topics in clinical practice (Xiao and Xu, 2014). Brand preference means patients prefer to choose patent/brand-name drug, rather than the generic counterpart. Quite a number of patients prefer brand name drugs to generic drugs especially in developing countries (Wang *et al.*, 2010). Health literacy refers to capacity of individuals to make appropriate health decisions based on health information (Manganello, 2008). A few studies suggested that poor health literacy has a negative impact on medication adherence (Kripalani *et al.*, 2010; Noureldin *et al.*, 2012). Furthermore, mood disorder is also reported to impact medication adherence. Depression and anxiety are common in patients with chronic diseases. A meta-analysis found that the relationship between depression and non-adherence was substantial and significant while the associations between anxiety and non-adherence were variable (DiMatteo *et al.*, 2000). A longitudinal study demonstrated that severe anxiety was a predictor of non-adherence to antiretroviral therapy in AIDS patients (Campos *et al.*, 2010).

To date, few studies were reported on risk factor in medication nonadherence in the rural areas. People in rural

areas are less-educated and poor in economic condition in a large proportion. Medical expense cost a lot and many rural people cannot afford to see a doctor. In spite of seeing a doctor, many cannot afford to get their whole prescription filled. Their medication adherence has been ignored for quite a long time. For this reason, this survey was conducted to explore the risk factors associated with medication nonadherence in the rural area of China.

MATERIALS AND METHODS

Outpatients with chronic diseases (chronic obstructive pulmonary disease, diabetes, hyperlipidemia, hypertension, etc) in this hospital, from Jan 1 to June 30, 2014 were invited to participate in this survey. All patients were briefed the aim and significance of this survey before the interview by pharmacist and gave verbal informed consent in this study. They were informed of their right to decline, discontinue the survey at anytime and without any reason. Then every patient was interviewed with a senior pharmacist individually in Out-patient Drug Information Consulting room. Patient was asked to answer a group of questionnaire including Chinese Medication Adherence Scale, PHQ 9, GAD7 and other self-designed instruments. The demographic information such as patient's age, gender, education and the number of chronic diseases were obtained. The survey was approved by this hospital's Clinical Research Ethics Committee.

Chinese Medication Adherence Scale (CMAS) was measured for each patient (Cao *et al.*, 2011). Using a cutpoint of <6, the sensitivity of the measure to identify patients with poor adherence was estimated to be 93% and the specificity was 53%. Patients with a score of less than 6 were regarded as medication nonadherence.

Brand preference (Cao *et al.*, 2011; Wang *et al.*, 2010) was measured by three questions as follows: (1) Do you think the quality of brand-name drugs is better than that of its generic counterpart? (2) Do you think the efficacy of brand-name drugs is better than that of its generic counterpart? (3) Do you prefer to choose brand-name drug in spite of high price? Each question is answered on a 4-point scale, with 4 being "Strongly agree" and 1 being "Strongly disagree". An integrated score was created by the addition of responses to each item (range from 3-12). Score of 12, 9-11 and 3-8 were defined as high brand preference, moderate brand preference and no preference, respectively.

Different from the general definition, health literacy inhere was defined as people's awareness to manage their health status in this study. It was measured by four questions as follows: (1) Do you think medication adherence is beneficial for disease control? (2) Do you know well about the medication you take? (3) Do you drink? (4) Do you smoke? The first two questions were on a 4-point scale, with 4 being "Strongly agree/quite understand" and 1 being "Strongly disagree/don't understand". The third question was on a 3-point scale, with 3 being "Never" and 1 being "often". The last question was on a 2-point scale, with 2 being "No" and 1

being "Yes". An integrated score was generated by the addition of responses to each item (rang from 4 to 13). Score of 10-13 and 4-9 were defined as adequate and inadequate health literacy, respectively.

Depression and anxiety symptom was evaluated by Patient Health Questionnaire (PHQ-9) and Generalized Anxiety Disorder 7(GAD-7), respectively (Al-Ghafri *et al.*, 2014; Kroenke *et al.*, 2010; Beard and Bjorgvinsson, 2014). The two questionnaires were on a 10-point scale, with ≥ 15 being "Severe depression or severe anxiety" and 10 being "No depression or no anxiety". Score between 10~15 was defined as moderate depression or moderate anxiety.

Statistical analysis: Data was analyzed with SPSS 13.0. All variables were analyzed by Chi-square tests for significant associations with medication adherence. The $p < 0.05$ were regarded as statistically significant.

RESULTS

The survey was carried on in Pharmacy Information Consult Room. This hospital is located in Fengxian, an agricultural less-developed rural area far away (55 km) from Shanghai downtown. It is the only biggest hospital within a radius of 30 km in the rural area. The surrounding residents usually come to this hospital to see a doctor.

A total of 325 patients with chronic diseases were recruited in this study, with 51.7% males, age ranging from 53-78 (the mean age 60 ± 9 years). All patients were treated with regular medication without any anti-anxiety drugs or antidepressants. The mean score of the CMCQ was 4.0 ± 1.7 (ranging from 0 to 8). About 80% of patients with a score of less than 6 were regarded as medication nonadherence, while about 20% of patients were regarded as medication adherence.

First of all, there is no significant difference between gender and age groups among the patient population regarding medication adherence. Although the low education patients accounted for a high proportion in the whole sample, each section showed similar medication adherence regardless of different education background (from illiteracy to higher education recipient) (Table 1).

More than 50% of patients had only one number of chronic disease and about 20% of patients suffered from 3 or more chronic diseases at the same time. Medication adherence decreased as the number of chronic diseases increased. The difference was statistically significant ($p < 0.05$) (Table 1).

Although the ratio of patients with moderate to high brand preference was greater (87.1%) than that of patients with no brand preference (12.9%) in the whole sample, each section showed same medication adherence of more than 20%. Meanwhile, the capacity to obtain, process and integrate health information and service do not necessarily improve practical medication adherence (Table 1).

In this survey, depression/anxiety symptoms significantly impacted medication adherence ($p < 0.01$). Patient with severe

Table 1: Three hundred and twenty five patients' characteristics and proportion of adherence patients

Characteristics	Proportion of patients *(n ₀)		Proportion of adherence patients** (n ₁)		p-value
	%	No.	%	No.	
Age (years)					
Younger than 60 years	40.0	130	21.5	28	0.717
61 to 70 years	48.9	159	20.1	32	
Older than 70 years	11.1	36	27.8	10	
Gender					
Female	48.3	157	20.0	33	0.826
Male	51.7	168	22.0	37	
Educational level					
No education to elementary	17.8	58	27.6	16	0.440
Secondary	72.6	236	19.9	47	
College degree or above	9.5	31	22.6	7	
Number of chronic disease					
1	54.2	176	27.8	49	0.011
2	25.2	82	14.6	12	
3 or more	20.6	67	13.4	9	
Brand preference					
High preference	27.4	89	22.5	20	0.873
Moderate preference	59.7	194	20.6	40	
No preference	12.9	42	23.8	10	
Health literacy					
Good	48.9	159	24.5	39	0.199
Not good	51.1	166	23.0	31	
Anxiety					
Severe anxiety	43.4	141	7.8	11	0.000
Anxiety	41.5	135	28.9	39	
No anxiety	15.1	49	40.8	20	
Depression					
Severe depression	38.8	126	8.7	11	0.000
Depression	43.1	140	23.6	33	
No depression	18.2	59	44.1	26	

*Proportion = n₀/325, **Proportion = n₁/n₀

depression or severe anxiety symptoms showed 10% medication adherence compared to 40~80% medication adherence in patients with no anxiety or no depression (Table 1).

DISCUSSION

Medication adherence is the degree to which patients take medications as directed by physician or pharmacist. There is no standard definition of "Adequate" adherence. No matter how it is defined, medication nonadherence is common. Many patients do not take a prescribed medication. Patients with chronic diseases typically take only 50% of prescribed doses (Bubalo *et al.*, 2010). In addition, about half of patients discontinue statins after only six months of treatment (Lemstra *et al.*, 2012). And up to 50% of patients discontinue antihypertensive therapy within the first year of treatment (Evans *et al.*, 2012). Nonadherence can lead to more morbidity, mortality and medical expense (Manning, 2011).

In this study medication adherence situation was investigated in an agricultural, less-developed area was investigated. The respondents are mainly elderly people, with no to elementary education. The primary finding of this study was that medication adherence is associated with the number of chronic diseases, anxiety and depression. The overall rate of adherence was 21.5%, which was much less than previous

study among patients with hypertension in Hong Kong (65.1%) and community-dwelling older adults in US (59%) (Cao *et al.*, 2011; Sirey *et al.*, 2013). No significant difference between gender, age and education for medication adherence in this study. A study conducted in Nigeria also found that age, gender and education level did not impact medication adherence but the employment was a significant variable (Okuboyejo, 2014). Meanwhile a few studies have concluded that age and education level were significantly related to medication adherence in elderly patients with chronic disease and female patients were at increased risk for nonadherence to statins therapy (Lee *et al.*, 2013; Lewey *et al.*, 2013).

In this study, patients with more than 3 chronic diseases were more non-adherent than patients with one chronic disease. This may be due to the reason that the former had more multiple drugs therapy. Dosing frequency is a determinant of medication adherence. Patients appear to be more adherent with once-daily medication regimen compared with multiple or complex regimens (Coleman *et al.*, 2012). In order to improve medication adherence, physicians should simplify the medication regimens for patients at the most extent.

It is a global problem for patients to choose brand-name drugs instead of generics especially in developing countries such as China (Xiao and Xu, 2014). A few studies compared medication adherence of patients treated with brand-name

drugs to generic counterparts. A study reported that generic drugs were associated with more medication adherence than brand-name drugs in patients with hypercholesterolemia or diabetes (Briesacher *et al.*, 2009). Generic medications could improve medication adherence (Shrank *et al.*, 2006). However, on the contrary, a study found that switching from brand-drug to generic counter-part led to decrease medication use (Tseng *et al.*, 2006). The result of this study showed that there was no significant association between brand preference and medication adherence. Although most respondents showed strong brand preference, they had to take prescribed medications. In this an agricultural, less-developed area, many respondents are not covered by health insurance and most respondents are not rich.

Health literacy seems not to be associated with medication adherence in this study. It suggested that the capacity to obtain, process and integrate health information and service do not necessarily improve practical medication adherence. A recent study also fails to find a significant relationship between health literacy and medication adherence (Ostini and Kairuz, 2014). It is worth noting that patients without health literacy were more likely to hold negative beliefs about generics (Iosifescu *et al.*, 2008). Furthermore, patients with health literacy had better adherence than those without health literacy (Ngoh, 2009).

In this study, patients with depression/anxiety were likely to be noncompliant. Depression has been recognized as one of the predictor of medication nonadherence. The latest research indicated that depression was independently associated with nonadherence among patients with advanced non-small cell lung cancer (Arrieta *et al.*, 2013). Depression and anxiety may be potential target for pharmacists and physicians in the effort to improve medication adherence of patients with chronic diseases.

The sample size was the primary limitation of this survey. The instrument used to measure the health literacy in this work was too simple and subjective and needed to be validated in future. Further well-designed, large sample of investigation is warranted to confirm our preliminary conclusion.

CONCLUSION

Medication nonadherence is common among patients with chronic diseases in the rural area in China. Depression/anxiety and the numbers of chronic diseases are risk factors for nonadherence.

REFERENCES

- Al-Ghafri, G., H. Al-Sinawi, A. Al-Muniri, A.S. Dorvlo, Y.M. Al-Farsi, K. Armstrong and S. Al-Adawi, 2014. Prevalence of depressive symptoms as elicited by Patient Health Questionnaire (PHQ-9) among medical trainees in Oman. *Asian J. Psychiatr.*, 8: 59-62.
- Arrieta, O., L.P. Angulo, C. Nunez-Valencia, Y. Dorantes-Gallareta and E.O. Macedo *et al.*, 2013. Association of depression and anxiety on quality of life, treatment adherence and prognosis in patients with advanced non-small cell lung cancer. *Ann. Surg. Oncol.*, 20: 1941-1948.
- Beard, C. and T. Bjorgvinsson, 2014. Beyond generalized anxiety disorder: Psychometric properties of the G AD-7 in a heterogeneous psychiatric sample. *J. Anxiety Disord.*, 28: 547-552.
- Briesacher, B.A., S.E. Andrade, H. Fouayzi and K.A. Chan, 2008. Comparison of drug adherence rates among patients with seven different medical conditions. *Pharmacotherapy*, 28: 437-443.
- Briesacher, B.A., S.E. Andrade, H. Fouayzi and K.A. Chan, 2009. Medication adherence and the use of generic drug therapies. *Am. J. Manage. Care*, 15: 450-456.
- Bubalo, J., R.K. Clark Jr., S.S. Jiing, N.B. Johnson, K.A. Miller, C.J. Clemens-Shipman and A.L. Sweet, 2010. Medication adherence: Pharmacist perspective. *J. Am. Pharm. Assoc.*, 50: 394-406.
- Campos, L.N., M.D. Guimaraes and R.H. Remien, 2010. Anxiety and depression symptoms as risk factors for non-adherence to antiretroviral therapy in Brazil. *AIDS Behav.*, 14: 289-299.
- Cao, X.Q., J. Zhang, L.Q. Zhuang, Y. Zhang and F. Xu, 2011. Effect of drug brand meaning response on drug selection and compliance in outpatients. *Pharm. Today*, 21: 444-446.
- Coleman, C.I., B. Limone, D.M. Sobieraj, S. Lee, M.S. Roberts, R. Kaur and T. Alam, 2012. Dosing frequency and medication adherence in chronic disease. *J. Manage. Care Pharm.*, 18: 527-539.
- DiMatteo, M.R., H.S. Lepper and T.W. Croghan, 2000. 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.*, 160: 2101-2107.
- Evans, C.D., D.T. Eurich, A.J. Remillard, Y.M. Shevchuk and D. Blackburn, 2012. First-fill medication discontinuations and nonadherence to antihypertensive therapy: An observational study. *Am. J. Hypertens.*, 25: 195-203.
- Iosifescu, A., E.A. Halm, T. McGinn, A.L. Siu and A.D. Federman, 2008. Beliefs about generic drugs among elderly adults in hospital-based primary care practices. *Patient Educ. Counsel.*, 73: 377-383.
- Jackevicius, C.A., M. Mamdani and J.V. Tu, 2002. Adherence with statin therapy in elderly patients with and without acute coronary syndromes. *J. Am. Med. Assoc.*, 288: 462-467.
- Kripalani, S., M.E. Gatti and T.A. Jacobson, 2010. Association of age, health literacy and medication management strategies with cardiovascular medication adherence. *Patient Educ. Counsel.*, 81: 177-181.

- Kroenke, K., R.L. Spitzer, J.B. Williams and B. Lowe, 2010. The patient health questionnaire somatic, anxiety and depressive symptom scales: A systematic review. *Gen. Hosp. Psychiatry*, 32: 345-359.
- Lacro, J.P., L.B. Dunn, C.R. Dolder, S.G. Leckband and D.V. Jeste, 2002. Prevalence of and risk factors for medication nonadherence in patients with schizophrenia: A comprehensive review of recent literature. *J. Clin. Psychiatry*, 63: 892-909.
- Lee, J.K., K.A. Grace and A.J. Taylor, 2006. Effect of a pharmacy care program on medication adherence and persistence, blood pressure and low-density lipoprotein cholesterol: A randomized controlled trial. *J. Am. Med. Assoc.*, 296: 2563-2571.
- Lee, S.K., B.Y. Kang, H.G. Kim and Y.J. Son, 2013. Predictors of medication adherence in elderly patients with chronic diseases using support vector machine models. *Health Inform. Res.*, 19: 33-41.
- Lemstra, M., D. Blackburn, A. Crawley and R. Fung, 2012. Proportion and risk indicators of nonadherence to statin therapy: A meta-analysis. *Can. J. Cardiol.*, 28: 574-580.
- Lewey, J., W.H. Shrank, A.D. Bowry, E. Kilabuk, T.A. Brennan and N.K. Choudhry, 2013. Gender and racial disparities in adherence to statin therapy: A meta-analysis. *Am. Heart J.*, 165: 665-678.
- Manganello, J.A., 2008. Health literacy and adolescents: A framework and agenda for future research. *Health Educ. Res.*, 23: 840-847.
- Manning, S., 2011. Bridging the gap between hospital and home: A new model of care for reducing readmission rates in chronic heart failure. *J. Cardiovasc. Nurs.*, 26: 368-376.
- Ngoh, L.N., 2009. Health literacy: A barrier to pharmacist-patient communication and medication adherence. *J. Am. Pharm. Assoc.*, 49: e132-e149.
- Noureldin, M., K.S. Plake, D.G. Morrow, W. Tu, J. Wu and M.D. Murray, 2012. Effect of health literacy on drug adherence in patients with heart failure. *Pharmacother. J. Hum. Pharmacol. Drug Ther.*, 32: 819-826.
- Okuboyejo, S., 2014. Non-adherence to medication in outpatient setting in Nigeria: The effect of employment status. *Glob J. Health Sci.*, 6: 37-44.
- Osterberg, L. and T. Blaschke, 2005. Adherence to Medication. *N. Engl. J. Med.*, 353: 487-497.
- Ostini, R. and T. Kairuz, 2014. Investigating the association between health literacy and non-adherence. *Int. J. Clin. Pharm.*, 36: 36-44.
- Shrank, W.H., T. Hoang, S.L. Ettner, P.A. Glassman and K. Nair *et al.*, 2006. The implications of choice: Prescribing generic or preferred pharmaceuticals improves medication adherence for chronic conditions. *Arch. Intern Med.*, 166: 332-337.
- Sirey, J.A., A. Greenfield, M.I. Weinberger and M.L. Bruce, 2013. Medication beliefs and self-reported adherence among community-dwelling older adults. *Clin. Therapeut.*, 35: 153-160.
- Tseng, C.W., R.H. Brook, E. Keeler, W.N. Steers, B.E. Waitzfelder and C.M. Mangione, 2006. Effect of generic-only drug benefits on seniors medication use and financial burden. *Am. J. Manage. Care*, 12: 525-532.
- Wang, L., X. Deng, S. He, L. Wang, G. Zhou and F. Xu, 2010. Influence of brand meaning response on drug selection in patients with hypertension. *Pharm. Today*, 20: 35-38.
- Xiao, Z. and F. Xu, 2014. Health literacy and medication preference: Why do most patients choose imported brand-name drugs? *Patient Educ. Counsel.*, 95: 155-156.