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Logistic regression analysis of drug compliance and influencing factors in elderly osteoporosis patients

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Abstract: A cross-sectional study was conducted to understand the medication compliance of elderly osteoporosis patients and to further analyze the influencing factors of drug compliance. The elderly osteoporosis patients who were admitted to the First People's Hospital of Huzhou, Zhejiang from March 2015 to January 2017 were selected as the research subjects. Subsequently, the three months, six months and 12 months of follow-up were performed from the group of subjects who prescribe anti-osteoporosis drugs to determine the patient's medication status. Hereon, a cross-sectional survey was conducted to investigate the status of drug compliance in elderly patients with osteoporosis. Moreover, multivariate logistic regression analysis was used to analyze the influencing factors of medication compliance. The discontinuation rates and causes were not the same in different time periods and the cumulative withdrawal rate was high (37%) within one year. A total of 492 cases of elderly osteoporosis patients were included in this study, whereas only 45.73% of patients had good drug compliance. Elderly patients with osteoporosis have poor medication compliance and education, marital status, and medication types all affect medicine-taking compliance of patients. Therefore, it is suggested that health education should be carried out, and psychological care of patients should also be strengthened. Meanwhile, the follow-up system for drug compliance should be established to improve medication compliance as well world wide.

Keywords: Osteoporosis, elderly people, compliance.

INTRODUCTION

Osteoporosis is an age-associated disease, which is influenced by genetic, epigenetic and environmental factors. Another main determinant of bone loss and fracture risk in old age is calcium and vitamin D deficiency.

It affects the normal life of aged people. It easily causes fractures in the elderly, resulting in serious consequences. Along with the aging of the population, the incidence of age-associated conditions increases, and more attention and resources are required for the management of these disorders in the elderly. In addition, the causes of this disease are complicated, and the elderly are prone to become ill. Therefore, in the course of treatment, the entire treatment and rehabilitation become complicated and difficult, so it must be attached much more importance to this issue (Wu *et al*., 2016). Fracture can be reduced by active prevention and treatment of osteoporosis, so as to improve the quality of life of patients (Mansur *et al*., 2008). Since osteoporosis is a chronic disease requiring long-term treatment, there is a problem of medication compliance (Kothawala *et al*., 2007). Patients receiving initial treatment for anti-osteoporosis are less than 70% in clinical practice. Even if they begin treatment, less than 50% of patients who have been able to take 1 years of medication and 2 years of medication compliance are lower (Mccombs *et al*., 2004; Gold *et al*., 2011). Medication noncompliance is a widespread clinical problem in the treatment of osteoporosis. The compliance of drug use directly affects the treatment regimen of the patients, so the compliance of patients should be given enough attention in the treatment regimen of elderly osteoporosis patients (Castel *et al*., 2001; Sewerynek *et al*., 2013). In this project, a cross-sectional study was applied to investigate the status and influencing factors of compliance of the elderly osteoporosis patients in Huzhou, Zhejiang Province, so as to improve the compliance of drug use and to provide the basis for the maximum effect of drug treatment.

MATERIALS AND METHODS

General data

Patients who were admitted to The First People's Hospital of Huzhou, Zhejiang from March 2015 to January 2017 were selected as the subjects, with the age of 66.72±2.86 years old. Inclusion criteria: (1) Patients who meet the WHO Osteoporosis diagnostic criteria as per MICHAEL

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et al, 2015; (2) Patients aged ≥ 60 years old; (3) The patient agreed to participate in the investigation and signed an informed consent form. Exclusion criteria: (1) Patients diagnosed with a fracture for the first time; (2) Patients currently suffering from malignant tumors; (3) Patients with severe liver and renal insufficiency and gastrointestinal disorders; (4) Patients that the researcher believes cannot complete the questionnaire; (5) Patients who are unwilling to cooperate with the investigation.

Questionnaire survey and basic situation of patients

A total of 500 questionnaires were issued in this survey, of which 5 respondents did not complete the survey because they did not cooperate and 3 questionnaires were excluded because of incomplete information. A total of 492 valid questionnaires were collected, the recovery rate was 100%, and the efficiency was 98.4%.Of the 492 elderly patients with osteoporosis, 300 cases (60.98%) were investigated from the urban area, 250 cases (50.81%) had education at college and above, and 268 cases (54.47%) were married. 260 cases (54.47%) lived alone (not living with their children); 234 cases were treated with monotherapy and 258 cases were treated with combination therapy. Besides, 201 cases were complicated with other diseases.

Research method

Cross-sectional survey research methods were used to conduct surveys by self-designed questionnaires. The survey includes: (1) General information, including name, place of residence, education level, family situation, disease status and medication status.(2) Medication compliance, using the Morisky self-reported adherence questionnaires (Morisky *et al.,* 2008) of patient self-reported indicators, including 8 questions: 1) Do you sometimes forget to take medication? 2): During the past two weeks, did you forget to take medicine one or several days? 3): When you feel the symptoms are aggravated or other symptoms appear during treatment, do you reduce your dosage or stop taking medicine without telling the doctor? 4): When you go out, do you sometimes forget to take medicine with you? 5): Did you take the medicine yesterday? 6): When you feel that your symptoms have improved or disappeared, have you stopped taking the medicine? 7): Do you think it is difficult to adhere to the drug treatment plan? 8): Do you think it is difficult to remember to take drugs on time? Scoring rules: 1-7 questions select "yes for 0 point," "no for 1 point ", 8th choice of the alternative answers to the Likert 5 grade score, that is, "no treatment, occasional treatment, sometimes treatment, regular treatment and all time treatment", which was counted as 1 point, 0.75 points, 0.50 points, 0.25 points and 0 point in turn, respectively. The full score of the scale was 8 points, and <6 points was classified as poor compliance, while ≥6 points was considered as better compliance.(3) The three months, six months, and 12 months of follow-up were performed from the group of subjects who prescribe anti-osteoporosis drugs to determine the patient's medication status.

Quality control

Before the questionnaire survey, the investigators were given unified training and pre-surveys to modify and improve the questionnaire. And the investigators would communicate with the research subjects before the investigation to explain the purpose and methods of the investigation so as to ensure the patient's active participation in the investigation and the integrity and reliability of the questions. After completing the questionnaire survey, the investigators would review the completeness of the questionnaire. If there were missing options or questions, the investigators would immediately conduct data verification with the research object. And data was entered using double entry.

STATISTICAL ANALYSIS

SPSS 21.0 software was used for statistical analysis. Chi-square test was used for comparison of rates, and logistic regression was adopted for correlation analysis. $p<0.05$ means a significant difference.

Ethical consideration

Tis study was approved from the institutional ethical review board of The First Affiliated Hospital of Huzhou Teachers' College, The First People's Hospital of Huzhou, Zhejiang, China. All the experiments were conducted as per Helsinki's declaration for human volunteers. All subjects gave informed, signed consent to participate in the study by themselves. The reference No was 554/ERB-HZC/2015.

RESULTS

Analysis of drug discontinuation rate in patients at different time intervals

From the prescription of anti-osteoporosis drugs, the withdrawal of drugs within 3 months, 3 to 6 months, and 6 to 12 months has been demonstration shown in table 1. The rate of discontinuation of drugs varies during different periods of drug use. Among them, the rate of discontinuation was highest at 3-6 months, and there was a statistically significant difference compared with the other two periods ($p<0.05$). Within 12 months of treatment, the cumulative withdrawal rate was 37.0% as shown in table 1.

Comparison of factors influencing medication compliance in elderly patients with osteoporosis

Among the 492 patients surveyed, 45.73% of patients had a medication adherence score of ≥6 points and were judged as having good adherence. 54.27% of patients had poor compliance (score <6 points). There was a

statistically significant difference ($p<0.01$) in the degree of patient education, marital status, type of medication, and medication compliance with other diseases as shown in table 2.

Multivariate logistic regression analysis

The factors with $p<0.05$ in the single-variable analysis were all included in the multivariate logistic regression model. In addition, it was shown in multivariate logistic regression analysis that the education level, marital status, and drug type of the patients were all independent factors that affected compliance ($p<0.05$), as demonstrated in table 3.

DISCUSSION

Osteoporosis is a chronic disease that needs long-term treatment. The treatment of osteoporosis is now more than 3~5 years, and some scholars even advocated life-long medication. However, it was depicted in this study that the current self-retention rate of drug for OP patients with anti-osteoporosis drug therapy is very high. And only 1 year after treatment, the rate of drug withdrawal is up to 37%.After just one year of treatment, the withdrawal rate was as high as 37%. Compliance is the extent to which the patient takes the medicine according to the doctor's advice. Non-compliance means the patient refuses to take or misses the service, increases or decreases the dosage of the medicine by him or herself, and chooses the time and sequence of self-selection. Consequently, the consequence is poor control of blood glucose, increased side effects and aggravation of the disease. Most patients require long-term medication, and many patients are interrupted for treatment because of poor compliance. Eventually, the disease cannot be controlled and crippled or even died (Moscovici *et al*., 2007, Morris *et al.,* 2013, Boyanov *et al,* 2014). Therefore, how to improve patient medication adherence becomes crucial. In this study, cross-sectional surveys were conducted to understand the status and influencing factors of medication compliance in elderly osteoporosis patients in Huzhou, Zhejiang Province. Meanwhile, the results showed that only 45.73% of patients had good compliance.

To further analyze the influencing factors of medication adherence in elderly patients with osteoporosis, the variables of univariate analysis with statistical significance was included in multivariate logistic regression analysis. And the results showed that education level, marital status, and medication type all affected medication compliance of patients. The higher the degree of education, the better the patient's compliance with medication, and the more highly educated patients are more likely to understand and pay attention to the diseases and medication knowledge, and it is easier to comply with the doctor's orders in medication, so the medication compliance is high. The compliance of the married patients is better than the widow or the divorced person, which may be related to the mental state of the elderly. Because living with a spouse, the emotions of the elderly are easily satisfied, and care and concern are more important in life, thus affecting medication compliance (Ettinger *et al*., 2009). The compliance of the patients with a single drug is better than that of the combined treatment. The patient takes a wide variety of drugs, with a high frequency of medication every day and a long course of treatment, which will cause a certain burden, while taking a single drug is simpler, and the patient is easy to accept under the condition that the disease can be controlled.

From the results of this study, the compliance of patients with osteoporosis in the elderly is facing greater challenges, and patient compliance can be improved from the following two aspects: 1) Health education and psychological care for patients are strengthened. This will enable the patient to better understand the condition, cause, treatment and daily life precautions of osteoporosis. Only when the patient is more aware of the disease will he pay attention to its medication, thereby improving the patient's medication compliance (Lei *et al*., 2009). In general, the patient is subjected to tremendous pressure both physically and mentally in the course of treatment. Obviously, the purpose of the patient's arrival in the hospital is nothing more than to cure the disease as soon as possible. Therefore, the nurse should give careful care and strive to resolve the patient's physiology and psychological problems in the course of treatment. Medical staff should timely understand the various needs of patients and their families during the patient visit, draw up a reasonable treatment plan, understand the patient's attitude toward each treatment method, evaluate the patient's economic ability and make health guidance according to the corresponding treatment plans, thereby providing some psychological services (Tylavsky *et al.,* 2008). Establish a medication compliance follow-up system. The follow-up of its use of drugs has a certain degree of supervision, making it more emphasis on the disease. Therefore, where conditions permit, a follow-up system can be established to contact the patient at regular intervals, ask about the most recent condition, answer the patient's questions, and solve problems at any time so as to urge patients to take long-term medication treatment (Curtis *et al*., 2009).

CONCLUSION

In conclusion, the compliance of patients with osteoporosis in the elderly in the region of Huzhou, Zhejiang, China, is generally low and educational status, marital status, as well as medication types all affect patient compliance. It is recommended to improve drug compliance in terms of health education, strengthening of patient psychological care, and establishment of follow-up system for drug compliance.

Table 1: Analysis of drug discontinuation rate in patients at different time intervals

Items	Within 3 months	3 to 6 months	6 to 12 months
Drug discontinuation rate	12.5%	19.4%*#	11.2%
Cumulative drug withdrawal rate	12.5%	28.6%	37.0%

Note: Compared with 3 months, *p<0.05; compared with 6-12 months, #p<0.05.

Table 2: Factors related to compliance of elderly patients with osteoporosis [n (%)]

Influence factors	N	Good compliance	Poor compliance	X^2	P
District					
Urban area	300	149(49.67)	151(50.33)	0.873	>0.05
Nonurban area	192	95(49.48)	97(50.52)		
Educational status					
High school and below	242	94(38.84)	148(61.16)	14.86	<0.01
College and above	250	170(68.00)	80(32.00)		
Marital status					
In marriage	268	164(61.19)	104(38.81)	13.05	<0.01
Widowhood or divorce	224	81(36.16)	143(63.84)		
Living conditions					
Living alone	260	128(49.23)	132(50.77)	0.47	>0.05
Live with children	232	115(49.57)	117（50.43）		
Medication type					
Monotherapy	234	147(62.82)	87(37.18)	20.91	<0.01
Combined therapy	258	83(32.17)	175(67.83)		
Complication with other disease					
Yes	201	72(35.82)	129(64.18)	23.56	<0.01
No	291	175(60.14)	116(39.86)		

Table 3: Multivariate logistic regression analysis of medication adherence in elderly patients with osteoporosis

Research Projects	Wald	P	OR	OR 95%CI
Educational status				
High school and below	6.128	<0.05	1.000	1.065~3.642
College and above			1.974	
Marital status				
Widowhood or divorce	5.063	<0.05	1.000	1.012~1.884
In marriage			1.592	
Medication type				
Monotherapy	7.451	<0.01	1.000	0.433~0.875
Combined therapy			0.648	
Complication with other disease				
No	1.842	>0.05	1.000	0.965~1.493
Yes			1.176	

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