

MEDICATIONS ADHERENCE IN PATIENTS WITH OSTEOPOROSIS AFTER VERTEBROPLASTY OR KYPHOPLASTY AT HANOI MEDICAL UNIVERSITY HOSPITAL

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Poor adherence to medication therapy is currently one of the most critical obstacles facing osteoporosis care and it is one of the main barriers for optimal therapeutic osteoporosis management, especially after surgical intervention. This paper presents medication adherence and explores factors associated with medications non-adherence in patients with osteoporosis after vertebroplasty or kyphoplasty. This is a retrospective case series included osteoporosis patients underwent vertebroplasty or kyphoplasty at Hanoi Medical University Hospital in 2019. Medication adherence was assessed using the validated Osteoporosis specific Morisky Medication Adherence Scale. A total of 42 patients participated in the study. Level of osteoporosis medication adherence decreased gradually with time of using medication: high adherence level after 1 month with OS-MMAS score was 8. Mean score of medium and low adherence after 3 months and 6 months were 6.64 ± 1.19 and 4.64 ± 2.18 , respectively. 57.14% of participants had low adherence (6 months). 73.81% patients forgot to take medication. The associated factors of medication adherence are residence area, occupation, education level, number of medication used, frequency of osteoporosis medication, failure to take medication and side effects. The current study reveals a low level of medication adherence and sheds the light on different causes of medication non-adherence among patients with osteoporosis after vertebroplasty or kyphoplasty. Identifying barriers for medication non-adherence is an important initial step for developing effective clinical pharmacy interventions for patients with osteoporosis.

Keywords: Medication adherence, osteoporosis, vertebroplasty, kyphoplasty.

I. INTRODUCTION

Osteoporosis is recognized as a serious public health problem, with approximately 200 million people being affected worldwide.¹ Osteoporosis occurs due to an imbalance in bone remodeling, resulting in an increased risk of having fragile bone and fracture.² In a recent study in Vietnam, we have estimated that approximately 29% of women aged 50 years or older had osteoporosis and about 28% of them have vertebral compression fractures.³

Nowadays, we need to focus on osteoporotic vertebral compression fracture (OVCF) which has become a severe medical issue with the global aging population. OVCF reduces life quality with chronic back pain, impaired mobility, and thus impact normal daily activities.⁵ Most OVCFs can be treated conservatively.

Since 1987, percutaneous vertebroplasty (PVP) and kyphoplasty (KP) have been highly advocated as treatment techniques for OVCF.⁶ Over the past years, the surgeons have frequently applied VP and KP with benefits, such as early pain control and height restoration of the collapsed vertebral body and have cured many OVCF patients.⁷ However, almost all patients after VP/KP still maintained anti-

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osteoporotic drugs regimen to treat osteoporosis conservatively and to prevent new OVCFs.

Poor adherence to medication therapy is currently one of the most critical obstacles facing osteoporosis care and it is one of the main barriers for optimal therapeutic osteoporosis management.⁷ As a result of non-adherence, more patients will not achieve the benefit from medical treatment, which consequently, results in inferior health outcomes, poor health-related quality of life and increased health care costs.⁸ Many determinants which include patient, disease and medication-related factors together with the asymptomatic features of the disease have been linked with reduced rates of adherence in the adult population with osteoporosis. Jarab and F.E. Cotté 's studies pointed out that as patients used ≤ 3 drugs and monthly medication had a higher adherence. These authors also mentioned the general characteristics as age, gender, education level, living area but with no statistically significant among 3 levels of adherence.^{9,10} Identifying barriers for medication non adherence is an important initial step for developing effective clinical pharmacy intervention for patients with osteoporosis.

In recent years, there has been an increasing awareness of medication adherence in patients with osteoporosis in clinical care. many countries worldwide have studies on medication adherence in patients with osteoporosis. Especially western countries such as Germany, Hungary, and Spain reported the data from studies about adherence to osteoporosis medication after 1 year.¹¹ In the Middle East countries, Anan Jarab et al. studied on medications non-adherence in patients with osteoporosis in Jordan after 6 months.⁹ However, those studies mainly focus on the research subjects as women with

postmenopausal osteoporosis and patients with osteoporosis undergoing conservative treatment. Until now, few studies have been reported to evaluate adherence to medication in patients with osteoporosis who had surgical intervention. The aim of the present study was to evaluate medication adherence and to explore factors associated with medications non-adherence in patients with osteoporosis post vertebroplasty or kyphoplasty at Hanoi Medical University Hospital.

II. METHODS

1 Setting

Time

From December 2019 to November 2020.

Location

Neurosurgery and Spine Surgery Department at HMU Hospital.

Procedure

Step 1: Designed the questionnaire and translated into Vietnamese.

Step 2: Collect data.

- Identified patients who meet the research at Neurosurgery and spine surgery department.

- All information was corrected by oral interviewing directly through calling: Assessed the level of compliance after at 1-3-6 months after surgery and reasons of non-adherence base on OS-MMAS. However, to ensure the accuracy for the data, we followed and re-evaluated after at 1-3 months after the first time initial interview.

Step 3: The reporting Fforms with missing data were removed before analyzing. Then we analyzed data analysis and gave conclusion.

2 Subjects

Inclusion criteria

All selected subjects (1) were diagnosed with

osteoporosis, (2) underwent VP/KP at the HMU hospital in 2019, (3) treated by osteoporosis medication and followed up.

Exclusion criteria

Patients (1) lost to follow-up.

3. Study Design and sampling

The study was conducted using a retrospective case series design and convenient sampling method was adopted due to the time limit of the research. This was a purposive sample size with 42 participants.

4. Study Instruments

Custom-designed questionnaire was used to collect information on socio-demographic variables including age, gender, living area, marital status, educational level, occupation, living condition, monthly income and BMI. Medical records were reviewed for information of medical history such as number of OVCFs, number of vertebrae underwent VP/KP, corticosteroid therapy, comorbidities, in addition to information related medication characteristic including type of osteoporosis medication, frequency of osteoporosis medication administration, total number of medications used. We assessed the level of medication adherence at 3 time points: after 1 month, 3 months and 6 months through OS-MMAS. Each of the 8 items of the disease specific OS-MMAS captures a specific medication taking behavior. The OS-MMAS scores can range from 0 to 8 and have been categorized into the following 3 levels of adherence: high adherence (score = 8), medium adherence (6 to <8), and low adherence (<6).¹²

5. Data Analysis

The data was documented and analyzed by SPSS 22.0 software. Descriptive analysis was used to describe by mean (standard deviations) and frequency (percentages). The

associations between the categorical predictors and medication adherence after 6 months were analyzed by the chi-square test when marginal frequencies were all greater than 5 and by the Fisher exact test when a marginal frequency was less than 5. The difference was statistically significant when $p < 0.05$.

III. RESULTS

In 2019, we recruited 42 patients who met the study inclusion criteria. The study population age ranged from 35 to 87 years with a mean \pm SD 70.45 ± 12.3 . The majority of the study participants were female (85.71%), married (64.29%), lived in rural area (86.5%), graduated from secondary school or lower (54.76%), retired (83.33%), high capital income (88.1%), lived with family or others (100%), normal BMI (54.78%).

Medical history of the study participants were presented that no trauma (66.67%), comorbidities (47.62%), used corticosteroids (47.62%), had one OVCF (64.29%). One participant had 4 OVCFs. Mean number of OVCFs was 1.48 ± 0.74 . Mean was 1.38 ± 0.54 . 64.29% underwent VP/KP on one vertebra. One participant had 3 vertebrae underwent VP/KP. 71.43% participants used weekly bisphosphonate while one who used monthly bisphosphonates were 28.57%. The mean number of medications used by participants was 3.07 ± 0.89 . Approximately, most of the study participants used 3 or less than 3 medications (71.43%) were prescribed oral Bisphosphonate therapy, Calcium carbonate and Vitamin D3 in combination.

According to OS-MMAS, medication adherence level decreased gradually with time of using medication (table 1). Failure to take medication was the most common form of non-adherence as shown by 73.81% of the participants.

Table 1. Scores of OS-MMAS

Medication adherence	Variables	Patients (N=42)	Percentage (%)
after 1 month	High adherence	42	100
	Low adherence	9	21.43
after 3 months	Medium adherence	20	47.62
	High adherence	13	30.95
Range of OS-MMAS scores: 4-8; Mean(SD): 6.64 (1.19)			
after 6 months	Low adherence	24	57.14
	Medium adherence	14	33.33
	High adherence	4	9.52
Range of OS-MMAS scores: 0-8; Mean (SD): 4.64 (2.18)			

* Fisher’s exact test

The associated factors of osteoporosis medication adherence were shown in Table 2. Participants from the rural area had a lower adherence than urbanites. Employed participants tended to have a higher adherence than retirees. High school graduate or less had lower adherence than college graduate or post graduate educated.

Participants with less than 3 drugs prescribed had a higher adherence. and weekly medication had lower adherence than monthly medication. There was no significant difference in the lack of trust in medication effectiveness with $p = 0.535$ and there was significant statistical difference in forgetting to take medication and adverse effects.

Table 2. Associated factors of osteoporosis medication adherence (n = 42)

Total N = 42	Variable	Level of adherence			p-value
		Poor	Medium	High	
		n (%)			
Living area	Urban	2 (8.33)	9 (64.29)	2 (50)	0.001
	Rural	22 (91.67)	5 (35.71)	2 (50)	
Occupation	Working	1 (4.17)	3 (21.43)	3 (75)	0.003
	Retired	23 (95.83)	11 (78.57)	1 (25)	
Educational level	Secondary school or lower	20 (83.33)	3 (21.43)	0	< 0.001
	High school	4 (16.67)	8 (57.14)	3 (75)	
	University or post graduate	0	3 (21.43)	1 (25)	

Total N = 42		Level of adherence			p-value
		Poor	Medium	High	
Variable		n (%)			
Number of medication used	≤ 3 drugs	13 (54.17)	13 (92.86)	4 (100)	0.019
	>3 drugs	11 (45.83)	1 (7.14)	0	
Frequency of osteoporosis medication	Weekly	22 (91.67)	6 (42.86)	2 (50)	0.003
	Monthly	2 (8.33)	8 (57.14)	2 (50)	
Forgetting to take medicine	Yes	24 (100)	7 (50)	0	<0.001
	No	0	7 (50)	4 (100)	
Side effects	Yes	10 (41.67)	1 (7.14)	0	0.027
	No	14 (58.33)	13 (92.86)	4 (100)	
Total		24	14	4	

IV. DISCUSSION

The current study is one of the first research to assess medication adherence in patients with osteoporosis after VP/KP in Vietnam. The obstacles to medication adherence identified in the present study should be considered useful for the development of future individualized intervention programs aimed at improving health outcomes for patients with osteoporosis.

The present study clearly suggests a low level of medication adherence among the study participants. Consistent with the current study's findings, in 2017, Sylvie demonstrated in a randomized controlled trial of 790 patients with osteoporosis at three health centers in the United States that only 24.8% of the study participant had high adherence after 6 months.¹⁰ Non-interventional study used the MMAS-8 among postmenopausal women with osteoporosis European. It pointed out that the range of mean MMAS-8 scores across the countries was 6.2-7.1. In Germany, Austria and Greece, the majority of patients had a low or medium MMAS-8 score for adherence

to medications taken before the start of the study, especially 57.6%, 67.0%, 74.8%, respectively.¹² In another study conducted to assess medication adherence in patients with osteoporosis, 72.3% of the participants were non-adherent to osteoporosis medication.⁹ However, it was higher than our study, in which 90.48% of participants were non-adherent.

Failure to take medicine was the most common form of non-adherence and was presented by more than half of the current study patients (73.81%). Our study was consistent with other published researches. According to Jarab's study in 2020, forgetting to take medication was the most common form of non-adherence and was presented by more than half of the study patient (57.1%).⁹ In the latter study, overlooking was the most common unintentional behavior while skipping doses to make the medication last for longer duration was the most common intentional behavior.¹³ Previous studies have shown that another reason of non-adherence includes

lack of belief in the benefit of medications, adverse effects, aversion to medications. Another study conducted by Yood et al. also reported that the belief in the benefit of the prescribed medications had a positive impact on medication adherence.¹⁴ In recent studies on adherence to osteoporosis medications, the majority of patients who discontinue therapy appeared to do so because of drug-induced adverse effects. Fear of adverse effects or other health risks was another commonly cited reason for discontinuing therapy.¹⁰

Consistent with the current study finding, there was significant difference between level of adherence and living area, occupation, education level. This result showed participants who live in rural area had a lower adherence than those who live in the city. The health service in rural area is usually poor and more difficult to access. Moreover, patients lived in urban areas have better living conditions and better access to information related to the disease, education programs on osteoporosis prevention and treatment in the mass media. Tran Thi My Hanh's study also pointed out that adherence levels in urban area were often much higher than in rural area.¹⁵ Employed people tended to have a higher adherence than retirees because working people might have better control of their time than retirees. Furthermore, elderly retirees often forget to take their medication. High school graduate or less had lower adherence than college graduate or post graduate educated. High education level will help raise people awareness about disease prevention, health promotion and improve access to health services. Other studies also evaluate the association between education level and medication adherence. However, there was no significant difference based on low and high education level with p -value was 0.301.¹⁰ This result suggests that osteoporosis medication adherence may be too broad a measure. Further

studies with further subdivisions of medication adherence are warranted.

The frequency of medication administration showed the difference between 3 levels of adherence. The result showed that weekly osteoporosis medication adherence was worse than monthly medication. Our study agrees with the study of F.E. Cotté in France. It showed that adherence to a monthly bisphosphonate treatment regimen was higher than weekly regimens in post-menopausal women. However, other study exploring the experiences and perceptions of postmenopausal women toward strategies to improve adherence to bisphosphonates found that 79.6% of patients with monthly bisphosphonates and 67.0% of patients with weekly bisphosphonates did not refill their prescriptions.¹⁰

Considering about total number of medications used, participants using 3 or less than 3 drugs had a higher adherence than those who using more than 3 drugs. This was consistent with other published researches. Jarab's research results showed that as the number of the prescribed medications increased, low level of adherence among the study participants was observed.⁹ This can be explained by the patient's fear of taking many drugs. Furthermore, it is possible that the medications have different intake schedule, leading to difficulty in memorizing the regimen.

Forgetting to take medicine, frequency of medication and increased number of medications were important factors affecting the level of adherence. However, these factors can be interfered managed to improve the quality of treatment. Therefore, health education programs need to be applied conducted in order to enhance the importance of medication adherence for patients before discharge. Medical staff and health care provider need to

deeply notice and consider about the control of using osteoporosis medication after discharge. Doctors should consider to prescription prescribe drugs that combine many ingredients medication with a composite formula to reduce the number of medication and a monthly medication regimen to improve adherence.

The present study has some limitations. The self-reported questionnaire used for data collection could have overestimated patients' responses due to the patients' desire to please the interviewer. Furthermore, the study was conducted in only one hospital site, which may limit the generalizability of the study findings. Finally, this study did not show the evidence related to the effectiveness of adherence due to a short time of study during the Covid – 19 pandemic; patients were unable to come for follow up examination and underwent BMD test. The study findings should guide the development of future management programs implemented with the aim of improving health outcomes in post- surgery osteoporosis patients.

V. CONCLUSION

The current study reveals a low level of medication adherence and sheds the light on different causes of medication nonadherence among patients with osteoporosis after VP/ KP. Mean score after 3 months and 6 months were 6.64 ± 1.19 and 4.64 ± 2.18 , respectively for medium adherence and low adherence respectively; there were 57.14% of low adherence (6 months). and 73.81% patients forgot to take medication. The associated factors of medication adherence: are living area, occupation, education level, number of medication used, frequency of osteoporosis medication use, forget failure to take medication and side effects. Identifying barriers for medication nonadherence is an important initial step for developing effective clinical pharmacy interventions for patients with osteoporosis.

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