

Quality of Life in Postmenopausal Women with Osteoporosis : A Case Study in One Hospital

คุณภาพชีวิตในสตรีวัยหมดประจำเดือนที่เป็นโรคกระดูกพรุน: กรณีศึกษาในโรงพยาบาลแห่งหนึ่ง

Isaree Junyasak, B.Sc.Pharm*; Tanattha Kittisopee, Ph.D.**

Junyasak I, Kittisopee T. Quality of Life in Postmenopausal Women with Osteoporosis: A Case Study in One Hospital. Thai Journal of Hospital Pharmacy 2011; 21(1):36-47.

The objectives of this study were to measure quality of life (QOL) in postmenopausal women with osteoporosis, using Qualeffo 41 and to examine factors influencing quality of life in postmenopausal women with osteoporosis. A cross-sectional descriptive study investigated quality of life in 45-year-old and older postmenopausal women with low bone mineral density (BMD) (≤ -2.5 standard deviations (SD) below normal peak bone mass), or were diagnosed as an osteoporosis, or taking osteoporosis drug. A total of 134 subjects were recruited from the Police General Hospital during December 2009 to March 2010. The interview-administered questionnaire consists of 4 parts which are demographic and clinical characteristics, quality of life, factors in health concerning, and factors in treatment. The mean, standard deviation, range, and multiple regression analysis were used for statistical analysis. Quality of life assessment was performed using the Qualeffo 41 (Thai version) which express in values ranging from 0 to 100, where 0 represents the best and 100 represents the worst quality of life. Results showed that the mean (\pm SD) total QOL score of postmenopausal women with osteoporosis was 34.86 (\pm 15.67). In each domain, the result showed that the score of pain domain was 30.34 (\pm 25.27), physical function domain was 36.82 (\pm 21.52), social activities domain 44.53 (\pm 22.35), general health perception domain was 44.47 (\pm 18.53), and mental domain scored was 24.60 (\pm 15.59). The patient's QOL was affected by five predictor variables which are type of occupation including; 1) labor, 2) housework, 3) duration of menopause, 4) exercise, and 5) dietary calcium and protein intake. Labor, housework, and duration of menopause were positively related to total score of the QOL. It could be explained that if the subjects do the labor or housework job or have long duration of menopause they might have worse quality of life, while exercise and dietary calcium and protein intake were negatively related to total score of the QOL. Thus, getting more exercise or consuming more calcium and protein diet is recommended in order to have better quality of life.

Keywords: Quality of life, osteoporosis, postmenopausal women, Qualeffo 41

*Master degree student, Pharmacy Administration Unit, Faculty of Pharmaceutical Science, Chulalongkorn University

**Pharmacy Administration Unit, Faculty of Pharmaceutical Sciences, Chulalongkorn University

อิสริย์ จรรยาศักดิ์, ฐณัญญา กิตติโสภี. คุณภาพชีวิตในสตรีวัยหมดประจำเดือนที่เป็นโรคกระดูกพรุน: กรณีศึกษาในโรงพยาบาลแห่งหนึ่ง. วารสารเภสัชกรรมโรงพยาบาล 2554; 21(1):36-47.

การศึกษานี้มีวัตถุประสงค์เพื่อศึกษาคุณภาพชีวิตในสตรีวัยหมดประจำเดือนที่เป็นโรคกระดูกพรุน โดยใช้แบบสอบถาม Qualeffo 41 และเพื่อศึกษาหาปัจจัยที่ส่งผลต่อคุณภาพชีวิตในผู้หญิงวัยหมดประจำเดือนที่เป็นโรคกระดูกพรุน โดยการศึกษาเชิงพรรณนา ณ จุดเวลาใดเวลาหนึ่ง (cross-sectional descriptive study) เพื่อหาระดับคุณภาพชีวิตของสตรีวัยหมดประจำเดือนที่มีอายุตั้งแต่ 45 ปีขึ้นไป ที่มีมวลกระดูก (BMD) น้อยกว่าหรือเท่ากับ ≤ -2.5 หรือ ได้รับการวินิจฉัยว่าเป็นโรคกระดูกพรุนหรือ ได้รับการรักษาโรคกระดูกพรุน ทำการเก็บข้อมูลกลุ่มตัวอย่างจำนวน 134 ราย ซึ่งเป็นผู้ป่วยโรงพยาบาลตำรวจ ระหว่างเดือนธันวาคม พ.ศ. 2552 ถึง เดือนมีนาคม พ.ศ. 2553 แบบสอบถามที่ใช้ในการศึกษานี้ ประกอบด้วย 4 ส่วน ได้แก่ ข้อมูลทั่วไปของผู้ป่วย แบบวัดคุณภาพชีวิต (Qualeffo 41) และปัจจัยเกี่ยวกับความสนใจในสุขภาพและปัจจัยเกี่ยวกับการรักษา สถิติที่ใช้ คือ ค่าเฉลี่ย ค่าเบี่ยงเบนมาตรฐาน ค่าสูงสุดและค่าต่ำสุด รวมทั้งใช้การวิเคราะห์ความถดถอยเชิงพหุ (multiple regression analysis) คุณภาพชีวิตมีค่าคะแนนตั้งแต่ 0 ถึง 100 โดยที่ค่าคะแนน 0 แสดงถึงคุณภาพชีวิตที่ต่ำที่สุด และค่าคะแนน 100 แสดงถึงคุณภาพชีวิตที่สูงสุด ผลการศึกษา พบว่า ค่าเฉลี่ยคุณภาพชีวิตของสตรีวัยหมดประจำเดือนที่เป็นโรคกระดูกพรุนเท่ากับ 34.86 (± 15.67) โดยในแต่ละด้านมีค่าดังนี้ ด้านความเจ็บปวดมีค่าเฉลี่ยเท่ากับ 30.34 (± 25.27), ด้านการทำงานของร่างกายมีค่าเฉลี่ยเท่ากับ 36.82 (± 21.52), ด้านการใช้เวลาว่างและกิจกรรมทางสังคมมีค่าเฉลี่ยเท่ากับ 44.53 (± 22.35), ด้านการรับรู้เกี่ยวกับสุขภาพโดยทั่วไปมีค่าเฉลี่ยเท่ากับ 44.47 (± 18.53), และด้านจิตใจมีค่าเฉลี่ยเท่ากับ 24.60 (± 15.59) ปัจจัยที่ส่งผลต่อคุณภาพชีวิตของผู้ป่วย ได้แก่ อาชีพ (ลักษณะใช้แรงงานและงานบ้าน) ระยะเวลาหลังหมดประจำเดือน การออกกำลังกาย และการรับประทานอาหารที่มีแคลเซียมและโปรตีน โดยที่อาชีพการใช้แรงงานและงานบ้าน และระยะเวลาหลังหมดประจำเดือนมีความสัมพันธ์ทางบวกต่อค่าคะแนนคุณภาพชีวิต นั่นคือ ถ้าผู้ป่วยประกอบอาชีพใช้แรงงานหรืองานบ้านหรือมีระยะเวลาหมดประจำเดือนนาน จะส่งผลให้คุณภาพชีวิตแย่ง ในขณะที่การออกกำลังกายและการรับประทานอาหารที่มีแคลเซียมและโปรตีน มีความสัมพันธ์ทางลบต่อค่าคะแนนคุณภาพชีวิตของผู้ป่วย ดังนั้น จึงควรสนับสนุนให้มีการออกกำลังกายและรับประทานอาหารที่มีแคลเซียมและโปรตีนมากขึ้น เพื่อให้มีคุณภาพชีวิตที่ดีขึ้น

คำสำคัญ: คุณภาพชีวิต โรคกระดูกพรุน สตรีวัยหมดประจำเดือน แบบสอบถามวัดคุณภาพชีวิต Qualeffo 41

Introduction

Osteoporosis is a common and serious disease associated with aging which affects an estimated 90 million people worldwide.^{1,2} The prevalence of osteoporosis among Thai women rose progressively with increasing age to more than half of woman population after the age of 70. The age adjusted prevalence of

osteoporosis was 19.8, 13.6, and 10.0 percent for lumbar spine, femoral neck, and intertrochanteric in age from 40-80 year.^{3,4} Osteoporosis is a skeletal disease characterized by low bone mass and microarchitectural deterioration with a resulting decrease bone strength and increase risk of fracture. The World Health Organization's (WHO's) definition of osteo-

porosis is based on bone mineral density in the spine and proximal femur measured with dual energy X-ray absorptiometry (DXA). Osteoporosis is classified as a bone mineral density 2.5 or more standard deviations below normal peak bone mass, which means T score ≤ -2.5 .^{5,6} The disease is more commonly seen in women than in men especially in postmenopausal women. Fracture is the important outcome of osteoporosis affecting mainly the hip, vertebrae, and wrist. In Thailand, almost 6.7 million Thai women more than 50 years old being diagnosed of osteoporosis according to the WHO's criteria, around 42,000 hip fractures occurs annually⁵. Hip fractures always lead to hospitalization and cause pain, serious disability, and excess mortality. Most hip fractures take place after a fall about 80 percent occurs in women and 90 percent in people older than 50 years old. Hip fractures are associated with significant morbidity.⁴ The incidence of vertebral fracture increases with increasing age and the female to male ratio is approximately 2:1. Only about a quarter of vertebral fractures result from falls and most result from routine activities such as bending, lifting objects, and climbing stairs. Vertebral fractures may cause pain and loss of function although no serious symptom revealed. Most wrist fractures happen in women, 50 percent of whom are older than 65 years old. Wrist fractures also leads to acute pain and loss of function but functional recovery is good

or excellent. In addition to pain and disturbance of physical function the osteoporotic fracture may reduce mobility and social interaction and cause emotional problems effecting quality of life impairment.^{2,7,8}

In health services research and in clinical trials, quality of life is used increasingly as an outcome measures in order to evaluate to gain data on the burden of disease, morbidity and health care use, and often in comparison with other diseases.⁷ Health related quality of life can be assessed by two different type instruments which are generic and disease specific instruments. The outcome of generic questionnaires can be compared with other diseases. However, these tools are not specific for any disease or age group. Examples of generic questionnaires are Nottingham Health Profile (NHP), the Short Form 36 of Medical Outcomes Study (SF-36), and the EuroQoL (EQ-5D). Disease-specific questionnaires are designed for patients with specific disease such as depression, myocardial infarction, and osteoporosis. There are many instruments are being developed to measured the quality of life in osteoporosis patient, like osteoporosis quality of life questionnaire (OQLQ), osteoporosis assessment questionnaire (OPAQ), quality of life questionnaire of the European foundation for osteoporosis 41 (Qualeffo 41) and quality of life questionnaire in osteoporosis (QUALIOST). In the sense that disease-

specific instruments measure quality of life more accurately in that particular disease than generic instruments because of more relevant questions, shorter administered and being more valid.^{4,7,9,10}

The Qualeffo 41 accepted by the International Osteoporosis Foundation (IOF) is self-administered and the most complete questionnaire. The English version Qualeffo 41 has been translated into various languages and validated in 10 countries in Europe. It contains five domains which are pain, physical function, social function, general health perception, and mental function. Thus, it is more suitable and useful to evaluate quality of life in osteoporosis patients by using Qualeffo 41.

Health related quality of life is one key indicator that can reflect the effectiveness of the treatment. In order to efficiency caring postmenopausal women with osteoporosis, it is critical to concern its influencing factors. There are many factors influenced quality of life in postmenopausal osteoporosis patients including socio-demographic characteristic, health concerning, and treatment. Socio-demographic is a general factor which may influence quality of life in patients such as, occupation, Body mass index (BMI), and duration of menopause. Although many studies have investigated this issue, they produced conflicting results. The association between quality of life and health concerning for instance exercise, dietary calcium and protein taking, and life style habits but few studies in

Thailand has examined in these issues. Furthermore, few studies have examined effect of medications use: duration of osteoporosis drug taking, side effect of osteoporosis drugs, duration of calcium taking, and side effects of calcium on quality of life in patients.

Objectives

1. To measure quality of life in postmenopausal women with osteoporosis, using Qualeffo 41.
2. To examine factors influencing quality of life in postmenopausal women with osteoporosis.

Methods

The subjects of this study were 45 years old and older postmenopausal women with low bone mineral density (BMD) (< -2.5 standard deviations (SD) below normal peak bone mass or were diagnosed as an osteoporosis or taking osteoporosis drugs. All patients were recruited from the Police General Hospital.

A cross-sectional descriptive study investigated quality of life in postmenopausal osteoporotic patients. Quality of life assessment was performed using the Qualeffo 41. Written informed consent was obtained from all participants. This study was approved by the Research Ethics Committee of the Police General Hospital. Data from all parts were collected using interview-administered questionnaires by the researchers.

Measurement. There were four parts of the questionnaire.

Part 1. Demographic and clinical characteristics questionnaire included occupation, BMI and duration of menopause.

Part 2. Quality of life was evaluated by a specific instrument for osteoporosis, named the quality of life questionnaire of the European foundation for osteoporosis 41 (Qualeffo 41) which presents five domains: pain; physical function (divided in three sub-domains: activities of daily living, jobs around the house, and mobility); social function; general health perception; and mental function. All scores are expressed in values ranging from 0 to 100, where 0 represents the best and 100 represents the worst quality of life. Translation and back translation were done by the researchers and the International Osteoporosis Foundation, independently.

Part 3. The question about factors in health concerning included exercise; dietary calcium and protein intake; and life style habits (caffeine, alcohol taking, and smoking).

Exercise was designed to obtain type and frequency data of physical activity to derive information about the usual exercise behavior pattern during the past 6 months for each subjects. The investigators developed this part considering study objectives and modified from previous study of “*Bouchard Three-Day Physical Activity Record*” for assessment of energy expenditure in adult

in Canada¹¹ which physical activities were separated in to 14 categories. Then for proper apply for Thai postmenopausal women it was modified into 4 categories as follow:

1. Light manual work e.g. quick walking, sweeping, stair climbing.
2. Moderate manual work e.g. plantation work.
3. Light sport or leisure activities e.g. cycling, yoga, thaichi chuan, Chinese dancing, golf.
4. Moderate sport or leisure activities e.g. jogging, aerobics, swimming, tennis, badminton.

In this study, exercise data was calculated for energy expenditure using the approximate energy expenditure (Kcal/d)

Diet questionnaire was designed by the researchers in order to ask patients about their frequency of dietary calcium and protein intake. There are 5 items in this part which ask about milk product, dried prawn or fish product, vegetable, nut product, and meat or egg consuming with 5 choices range in everyday, 4-6 days/week, 2-3 days/week, 1 day/week, and not take in value ranging from 5 to 1, respectively.

The questionnaire about life style habits include 3 yes-no question about caffeine, alcohol drinking, and smoking.

Part 4. The question about factors in treatment included duration of osteoporosis drug taking, side effects of osteoporosis drugs,

duration of calcium taking, and side effects of calcium.

Data Analysis. Collected data from questionnaires and medical record were analyzed by using SPSS statistical package 17.0 for windows

General characteristics of the patients included socio-demographic characteristics, health concerning, and treatment data were described. The results were presented by mean, standard deviation, range in continuous data, and frequencies and percentage in category data. The mean and standard deviation of the Qualeffo 41 score were presented. Factors associated with quality of life in postmenopausal women with osteoporosis were identified by a multiple regression analysis.

Results and Discussions

Demographic and clinical characteristics were shown in Table 1. The mean age of the postmenopausal women with osteoporosis

was 70.23 years (± 8.96). The average body mass index (BMI) was at healthy level. There were only 70 subjects (52.24 percent) confirmed as osteoporosis by measuring with dual energy X-ray absorptiometry (DXA). The remaining 64 patients (47.76 percent) were identified as osteoporosis by the specialists or by mean of osteoporosis drug taking. The average BMD or T-score of the subjects was lower than -2.5 which mean that they suffered from osteoporosis. In addition, age at menopause of the subjects ranged between 45-50 years old. Our data showed a wide range of menopausal duration because of the wide distribution of the subjects which ranged from 49 to 95 years old. The missing data caused by three patients could not remember their ages at menopause. Moreover, the most of the subjects are employed sedentary job (41.79 percent) during working age (20-60 years old) followed by labor (35.07 percent) and housework (23.13 percent).

Table 1 Range, mean, standard deviation of demographic, and clinical characteristics of osteoporosis patients

Patient Characteristics	n	Range	Mean	Standard deviation
Age	133	49.00-95.00	70.23	8.96
Weight (Kg)	134	32.00-89.00	58.06	10.45
Height (cm)	133	139.00-170.00	154.22	5.59
Body mass index (BMI)	133	14.67-35.11	24.35	3.96
BMD (T-score)	70	(-5.20)-(-1.40)	-2.68	0.63
Duration of menopause (year)	131	1.00-51.00	22.23	10.23

The total score of Qualeffo was calculated by summing all answers of questions 1-41. The raw total score ranged from 41 to 205. The mean score of actual quality of life score was 94.69 ± 24.76 which were transformed into standardized quality score (0 to 100) was 34.86 ± 15.67 . As mentioned above 0 represents the best and 100 represents the worst quality of life.

Qualeffo 41 presents five domains which are pain, physical function, social activities, general health perception, and mental function. As shown in Table 2, mental domain revealed the lowest quality of life score which represented highest quality of life level. Mental domain captured both positive and nega-

tive feeling and emotion such as fulfill of energy, hopeful, friendly, tired, downhearted, lonely, upset, and scared. The second high quality of life level was pain domain. This domain was measured by asking about frequency of pain, duration of pain, severity of pain at worst and other time. The third rank was physical function domain which consisted of activities of daily living, jobs around the house, and mobility. The forth rank was general health perception domain, in which subjects evaluated their health comparing to others with the same age at the present and in the past. The last was social activities domain such as doing hobby, playing sport, gardening, going to cinema, visiting friend or relative, and having problems in sexual activity.

Table 2. Range, mean, standard deviation, Cronbach's alpha of total score of each domain, and total quality of life score

Total score	n	Range	Mean	Standard Deviation	Cronbach's Alpha
Pain	134	0.00-100.00	30.34	25.27	0.837
Physical function	134	1.47-98.53	36.82	21.52	0.926
Social activities	134	0.00-100.00	44.53	22.35	0.675
General health perception	134	0.00-100.00	44.47	18.53	0.590
Mental	134	0.00-83.33	24.60	15.59	0.760
Quality of life	134	6.25-80.63	34.86	15.67	0.841

Health concerning variable consisted of five parts which are exercising, dietary calcium and protein consuming, caffeine taking, alcohol drinking, and smoking.

The range, mean, standard deviation of exercising, dietary calcium and protein

consuming presented as energy expenditure and dietary calcium and protein consuming as dietary score which value 5-25 (the higher the score indicated the more patients take calcium and protein food). The score showed in the following Table 3. Most of the subjects

preferred quick walking, sweeping, and stairs climbing which are considered as light manual work. The source of calcium and protein diet, which most of the subject intake were meat, egg, vegetable, milk product, bean product,

and dried prawn or fish respectively. Around 5 percent of subjects drink alcohol. The majority of subjects or 94 percent drink caffeine beverage such as coffee, tea, and cocoa respectively while none of the subjects smoke.

Table 3. Range, mean, standard deviation of energy expenditure, and dietary score

Health Concerning	n	Range	Mean	Standard deviation
Energy expenditure (Kcal/d)	134	0.00-611.33	156.52	132.63
Dietary score	134	5.00-25.00	17.72	3.70

The fourth part: descriptive data of treatment was composed of two parts which were duration of medication taking and having side effect from medication. The duration of osteoporosis drug taking in this study was derived from the sum total of duration of every osteoporotic medication taking. For example, a patient took raloxifene for 3 years and after 2 years of discontinuing the patient took alendronate for 2 years, so the duration of osteoporosis drug taking of

the patient would be 5 years. The drug taken by most patients was risedronate (n=69), in contrast, strontium renelate was taken by few patients (n=12). Moreover, the duration of raloxifene taking was the longest or around 4 years and 3 months in average among the other drugs. As regards calcium, duration of calcium taking ranged between 0 to 21 years with mean score approximately 5 years and 2 months. The data showed in the following Table 4.

Table 4. Range, mean, and standard deviation of duration of medication taking

Health Concerning	n	Range	Mean	Standard deviation
Osteoporosis drugs				
Alendronate ^a	58	2.00-89.00	26.04	24.17
Risedronate ^a	69	1.00-120.00	31.25	27.88
Ibandronate ^a	33	1.00-54.00	19.73	12.88
Raloxifene ^a	23	4.00-126.00	50.83	31.57
Calcitonin nasal spray	17	1.00-78.00	22.12	22.01
Strontium renelate ^a	12	1.00-15.00	5.08	3.92
Treatment duration	134	0.00-126.00	38.43	31.45
Calcium	134	0.00-252.00	61.35	46.07

^aOriginal drugs

Side effects from medication are abdominal pain, dyspepsia, constipation, diarrhea, flatulence, esophageal ulcer, headache, nausea and vomiting for bisphosphonate; leg cramps, hoflushes, myalgia for raloxifene; nausea, vomiting, dizziness for calcitonin nasal spray; and nausea, vomiting, headache for strontium renelate. Most patients did not have side effects from medications but only 14 percent have side effects, as well as, side effects from calcium which did not occur in 90 percent of patients but the rest or 13 patients had side effects which were abdominal pain and constipation.

It was found that patient's QOL was affected by five predictor variables [labor, housework, duration of menopause, energy expenditure (Kcal/d), and dietary score].

Labor, housework, and duration of menopause were positively related to total score of the QOL. Energy expenditure and dietary score were negatively related to total score of the QOL.

As the result shown in Table 5, the standardized regression coefficient value was considered and it indicated that energy expenditure had the highest beta coefficient which is -0.462, followed by labor ($\beta=0.330$), duration of menopause ($\beta=0.173$), housework ($\beta=0.163$) and dietary score ($\beta=-0.160$), respectively. In the other word, energy expenditure had the most influence on quality of life of postmenopausal women with osteoporosis, followed by labor, duration of menopause, housework, and dietary score respectively.

Table 5. Coefficients of selected variables in multiple regression for quality of life of osteoporosis patients

Variables	Coefficients		Standardized	t	Significance
	Unstandardized Beta	Standard Error	Coefficients Beta		
(Constant)	40.223	9.688		4.152	0.000
Labor	10.701	2.589	0.330	4.133	0.000
Housework	6.049	2.812	0.163	2.151	0.033
Duration of menopause	0.262	0.108	0.173	2.424	0.017
Energy expenditure (Kcal/d)	-0.054	0.008	-0.462	-6.463	0.000
Dietary score	-0.687	0.294	-0.160	-2.334	0.021

Dependent variable: total mean QOL score; $R = 0.696$, $R^2 = 0.484$, $F = 9.163$

The result revealed two ways of relationship directions: positive and negative directions. The positive directions are physical

activities and dietary calcium and protein intake. Physical activities influenced quality of life in the subjects positively, therefore,

patients should be advised to change their lifestyles and get exercising. Besides, dietary calcium and protein intake also affected quality of life in the positive way or caused lower quality of life score which showed that poor intake of calcium was associated with the risk of osteoporosis and may impair quality of life as well.

On the other hand, occupation including; labor, housework and duration of menopause negatively influenced the quality of life in patients, namely these two occupations may cause worse quality of life of patients because of two reasons. One reason is that labor could debilitate patients more than housework and sedentary job and could cause higher risk of fractures. Another reason is that patients who do sedentary job have better way of living. They are well-educated, have a good way of livings and have more chance to seek for better things for themselves, for example, they search information about health in order to take care of themselves, they often go to see the doctor for getting treatment or checking up. They have more opportunities to participate in social activities such as, visiting cinema and playing sports. The questions about occupation are also focused on urban lifestyle which most of patients with sedentary job are live in urban while rural patients mostly do labor job or housework. Additionally, duration of

menopause negatively influenced quality of life. It meant that the longer the time since menopaual is, the worse quality of life could be. The long menopause duration resulted in increasing rate of bone loss which leads to having risk of fracture and impairing quality of life.

Conclusions

The findings presented that the mean (\pm SD) total QOL score of postmenopausal women with osteoporosis was 34.86 (\pm 15.67). The patient's QOL was affected by five predictor variables which are labor, housework, duration of menopause, energy expenditure, and dietary score. Labor, housework, and duration of menopause were positively related to total score of the QOL, while energy expenditure and dietary score were negatively related to total score of the QOL.

According to the result of the study which found that health concerning related to exerting and dietary calcium and protein intake, and then caused higher quality of life. Hence, postmenopausal women should be informed about the advantages of exercising and dietary calcium and protein intake in positively affecting quality of life in order to induce the women to pay more attention on their health. Moreover, women should be advised before they suffer from the osteoporosis.

Limitations of the Study

The first limitation of this study was the accuracy of classifying osteoporosis due to the limitation of DXA in the Police General Hospital. Therefore, the study population consisted of the patients whose bone mass density were measured with DXA and the patients who diagnosed as osteoporosis by specialist or medication taking history. Second, Qualeffo 41 is designed to be a self-administered questionnaire, but in this study the mode of administering was changed to interview-administered questionnaire because of the eye-sighted limitation in these elderly patients or low level of education. Third, some questions in Qualeffo 41 were not fit with Thai lifestyle and culture of the participants. In physical function domain the limitation of the content was found in item 21: Can you use public transport (bus)? According to the fact that public mass transportation system (bus) in Thailand does not provide convenience to the passengers like in developed countries which bring about the invalid measurement, that is the patients could possibly use another transportation apart from bus such as, taxi or sky train,

without difficulty or with little or moderate difficulty. The mode of transportation “*taxi*” would be a good proxy for “*bus*” in Thai version questionnaire. Another limitation of the content is item 26: Can you visit a cinema, theatre? Due to the Thai culture, most of the patients answered ‘*not at all*’ in this item but if they are asked about other activities such as eating out, they can do these activities. Hence, the activity “*eating out*” would be a good proxy for “*visiting a cinema*” in Thai version questionnaire as well. Last, this study asked about the overall frequency of calcium and protein diet intake, not all details in measuring dietary calcium and protein intake.

Acknowledgements

The authors would like to thank the European Foundation for Osteoporosis for the permission to use Qualeffo 41 and also wish to thank Assistant Professor Rungpetch Sakulbumrungsil and Police Colonel Seree Teerapong for helpful suggestions, comments, and advices. Lastly, the authors thank all members at the postmenopausal and orthopedic clinics in the Police General Hospital for providing facilities.

References

1. Johnell O Kanis JA. An estimate of the worldwide prevalence and disability associated with osteoporotic fractures. *Osteoporos Int* 2006; 17(12): 1726-33.
2. Silverman SL. Quality-of-life issues in osteoporosis. *Curr Rheumatol Rep* 2005; 7(1): 39-45.
3. Limpaphayom KK, Taechakraichana N, Jaisamrarn U, et al. Prevalence of osteopenia and osteoporosis in Thai women. *Menopause* 2001; 8(1): 65-9.
4. Pongchaiyakul C, Songpattanasilp T, Taechakraichana N. Osteoporosis: overview in disease, epidemiology, treatment and health economy. *J Med Assoc Thai* 2008; 91(4): 581-94.
5. Pongchaiyakul C, Songpattanasilp T, Taechakraichana N. Burden of osteoporosis in Thailand. *J Med Assoc Thai* 2008; 91(2): 261-7.
6. Poole KE, Compston JE. Osteoporosis and its management. *BMJ* 2006; 333(7581): 1251-6.
7. Lips P, van Schoor NM. Quality of life in patients with osteoporosis. *Osteoporos Int* 2005; 16(5): 447-55.
8. Sambrook P, Cooper C. Osteoporosis. *Lancet* 2006; 367(9527): 2010-8.
9. de Oliveira Ferreira N, Arthuso M, de Silva R, et al. Quality of life in women with postmenopausal osteoporosis: correlation between QUALEFFO 41 and SF-36. *Maturitas* 2009; 62(1): 85-90.
10. Morris R, Masud T. Measuring quality of life in osteoporosis. *Age Ageing* 2001; 30(5): 371-3.
11. Bouchard C, Tremblay A, Leblanc C, et al. A method to assess energy expenditure in children and adults. *Am J Clin Nutr* 1983; 37 : 461-7.