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The influence of alendronate therapy on the quality of life in postmenopausal women with reduced bone mineral density

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ABSTRACT

Aim. The aim of the study was to evaluate the effect of treatment on the quality of life (QoL) in postmenopausal women characterized by the reduced BMD.
Material and Methods. Postmenopausal women (n = 102), mean age (65.09 ± 5.6 years) were included in this study. The participants were divided into two groups, depending on the treatment or lack of treatment. For assessment of their QoL, QUALEFFO-41 scale and WHOQOL-100 scale were used.
Results. Mean values of the QUALEFFO-41 scale of women who used alendronate were significantly lower than those found in subjects not treated with this drug in the following areas: pain (p = 0.03), ADL (p = 0.03), jobs around the house (p = 0.01), mobility (p = 0.01), health perception (p = 0.03), emotional function (p = 0.007) and total QoL (p = 0.005). The mean values of the WHOQOL-100 scale almost did not differ significantly between both groups of studied patients. An exception was the level of independence, with mean values of women not receiving bisphosphonates being significantly higher than those of patients using bisphosphonates therapy (p = 0.04).
Conclusions. Quality of life assessment of women with osteoporosis and osteopenia using a specific scale and general scale can be a valuable clue in the planning of treatment, nursing care and psychological care.

Keywords: HRQoL; alendronate therapy; postmenopausal women; osteoporosis; QUALEFFO-41; WHOQOL-100;

Introduction

Reduced bone mineral density (BMD) and tissue degradation is one of the major public health problem at the present time. Postmenopausal women with reduced BMD are particularly vulnerable to fractures because of fragility, especially when they have poor balance which increases their risk of falling. With age, these problems are becoming increasingly important and more and more strongly deteriorate quality of life (QoL). Fracture sufferers require comprehensive and long-term customised treatment, considerable expenditure, comprehensive social support as well as nursing and rehabilitative care due to their disability and impaired QoL. Approximately 20% of patients with osteoporotic hip fractures die within one year, most of the deaths occurring within the first six months after a fracture [1]. Among these patients, 30–50% never regain their the previous functional status [2]. Numerous studies have demonstrated that the use of bisphosphonates reduces bone turnover, increases BMD and decreases the risk of fractures in patients with reduced BMD [3–9]. Currently, it is believed that bone resorption is inhibited not only directly by exerting effect on osteoclasts, but also indirectly through osteoblasts. The effect of bisphosphonates on osteoblasts consists in inhibiting certain cytokines, which may result in suppressing recruitment of osteoclast precursors and inhibiting the process of the precursors maturing into polynuclear osteo-

clasts. Moreover, a low molecular mass agent, whose release from osteoblasts is induced by bisphosphonates, inhibits the activity of mature osteoclasts and osteoclastogenesis. Furthermore, bisphosphonates stimulate synthesis of proteins and type I collagen as well as increase the activity of alkaline phosphatase and the amount of formed bone tissue [10–11]. Currently, the use of the medicines for therapy of women with postmenopausal osteoporosis has been increasing.

Numerous studies have confirmed that bisphosphonates not only reduce the incidence of fractures and increase BMD but also improve QoL [12–17]. According to the assumptions of the WHO, the concept of the quality of life determined by the state of health (Health-Related Quality of Life – HRQOL) covers the functionality in fundamental domains: physical, psychological, social and subjective assessment of the patient. This concept includes both objective and subjective evaluation. Furthermore, it is most often used to evaluate the effect of treatment [18].

Aim

This study aimed to assess the objective and subjective quality of life of postmenopausal women with reduced BMD and compare the short-term results on the QoL for a group treated with alendronate and a group not receiving such therapy. In addition, the aim of the study was to identify factors associated with the total quality of life of women with reduced BMD.

Material and Methods

The study was approved by the Ethical Review Committee at the Poznan University of Medical Sciences.

Study group

The study group consisted of 102 postmenopausal women treated in the Menopause and Osteoporosis Outpatient Clinic of the Obstetric and Gynaecological Hospital of Poznan University of Medical Sciences.

They were enrolled to this study on the basis of their densitometry results. The main inclusion criterion was BMD expressed as T-score below or equal to -1.0 standard deviation (SD). Regarding to BMD results, on the basis of the World Health Organisation definition of osteoporosis [19] women were classified as osteoporotic if their T-score was below or equal to -2.5 SD and osteopenic if its value was above -2.5 SD or below or equal to -1.0 SD in at least one of the measured areas (either the lumbar spine, or femoral, or both). The exclusion criteria were as follows: secondary osteoporosis, metabolic bone disease, malignant bone metastasis, hypogonadal states, osteogenesis imperfecta and treatment with glucocorticoids or any other disease which are known to significantly reduce quality of life such gastrointestinal tract disease, rheumatoid arthritis, severe osteoarthritis, hematological and endocrine disorders. Additional exclusion criteria were: currently bone fracture and the existence of the other diseases influencing the functioning of the locomotor system of the women.

BMD measurement

In all the women included in the study, BMD in the lumbar spine (L_1–L_4) and femoral neck was measured by dual energy X-ray absorptiometry (DXA) using a LUNAR device. The DXA method involves a very low radiation dose similar to that of natural background radiation (~7μSv/Day) [20]. Measurements of bone mineral content (gram) and area (cm²) are provided for each measurement site. BMD results are expressed as an areal density in g/cm². The coefficient of variation (CV) is 0.7% at the lumbar spine and 1.0% at the hip [19]. BMD was compared with an appropriate ethnic and gender matched reference database, and was expressed as a standard deviation score (SD) from the mean of either young adult (T-score) or age matched (Z-score) [21].

Clinical parameters and sociodemographic factors

On the day of BMD examination, the body mass and height were measured. The Body Mass Index (BMI) was calculated according to the following formula: BMI = body mass/height² (kg/m²). The subjects also responded to questions about sociodemographic and clinical parameters: history of previous fragility fractures, family history of fractures, current smoking, current alcohol consumption, physical activity, date of the last menstruation in the patient's life.

FRAX based assessment of the risk of fractures

The FRAX method [4, 5] has been used to assess the 10-year probability of fracture for individual study groups. The average BMD values, evaluated for the femoral neck and clinical risk factors were calculated.

Therapy

Patients with a history of previous fragility fractures, with vertebral deformities as well as those with family history of osteoporosis fractures received bisphosphonates therapy. Sixty seven of them (65.7%) were administered weekly doses of 70 mg alendronate.

Thirty five patients (34.3%) did not use the therapy. All subject had been receiving daily doses of 500 mg calcium and 400 IU vitamin D.

It should be emphasized that the patients prior to the start of the study did not receive any medication for osteoporosis.

Based on whether the participants received alendronate or not, the study group has been divided into two groups.

Evaluation of quality of life

The quality of life (QoL) was evaluated twice, i.e. before the bisphosphonates therapy and 3 months after the first survey. We used two scales, i.e. QUALEFFO-41 scale (as an objective quality of life scale) and the scale of WHOQOL-100 (as a subjective assessment of quality of life).

The women responded to questions contained in questionnaires used for assessment of quality of life – the QUALEFFO-41 scale (for objective assessment of life quality). Psychometric properties of the Polish version of the QUALEFFO-41 scale were assessed by a research team headed by Bączyk [22]. The QUALEFFO-41 scale is used for overall assessment of the quality of life as well as evaluation of the quality of life with respect to physical, social and emotional function and pain. In our study we have employed the QUALEFFO-41 scale for assessment of life quality of persons with reduced BMD without vertebral fractures as well as those with vertebral fractures, whose BMD was measured for the lumbar spine. The Polish version of QUALEFFO-41 scale, like the original version, consists of 41 question divided into five domains: pain, physical function, social function, general health perception and emotional function. The physical function domain was divided into: activities of daily living, jobs around the house and mobility. Domain scores were assessed according to the algorithm proposed in 1999 by Lips et al [23], where 0 represents the best and 100 the worst quality of life.

WHOQOL-100 Polish scale serving for subjective evaluation of quality of life and contains the following domains: physical, psychological, independence, social, environmental and spiritual (religion, personal beliefs). The scale is designed in such a manner that patients may respond to questions on their own using a five point Likert response scale, with the points range for each domain being 4–20. The higher the scores, the better quality of life [24].

Statistical analysis

The statistical description uses numbers, percentages, mean values and SD. Comparison of group results on the QUALEFFO-41 and WHOQOL-100 was performed after converting values for the purposes of specific tools. Differences between groups with regard to QUALEFFO-41 and WHOQOL-100 were analysed using the t-Student test and ANOVA analysis of variance for independent and dependent data. For groups unevenly numerous test results verified the corresponding nonparametric tests, Welch test was used.

A determination of predictive factors for total QoL was performed using stepwise logistic regression analysis and Akaike Information Criterion (AIC) for model assessment. The cut-off for the total QUALEFFO-41 scale was set at the median the overall score. Score equal to the median, or lower, indicated a high QoL, while score higher than the median pointed to a low QoL. The cut-off for the WHOOL-100 scale was set at the median the overall score. Score equal to the median, or lower, indicated a low QoL, while score higher than the median pointed to a high QoL.

The regression analysis model used the quantitative continuous variables: age, BMI (kg/m^2), the other variables were considered as categorical (0–1): education, previous fractures, reduced height, physical activity and use of bisphosphonates.

The significance level was accepted as $p < 0.05$. The statistical analysis was performed using the SPSS Windows package, Version 20 (SPSS Inc., Chicago, IL, USA).

Results

Demographic and clinical characteristics of the study group and BMD results

The mean age of the studied postmenopausal women was 65.09 ± 5.6. Most women (73.5%) included in this study lived with their families and had a secondary education (56.9%). Forty percentage of women led a sedentary lifestyle and almost 16% patients were current cigarette smokers.

At the time of enrollment, among 78.4% of women the osteoporosis was diagnosed, whereas osteopenia was revealed in 21.6%. Twenty seven women (26.5%) had a history of previous fragility fractures. None of them sustained a femoral neck fracture. On the other hand, wrist or forearm fractures occurred in almost 13.7% of osteoporotic patients. Parental history of fracture was reported by 36.3% of women. Hip fracture was recorded in 1 parent of women. Moreover, wrist or forearm fractures were reported in 24.5% of parents of studied participants. BMD was evaluated based on the T-score for L_1-L_4 and for femoral neck:

For lumbar spine, the mean BMD was 0.82 ± 0.07 g/cm² and the mean T-score was -2.99 ± 0.34, while the values for the femoral neck amounted to 0.61 ± 0.07 g/cm² (BMD) and -2.98 ± 0.34 (T-score). For detailed information see in **Table 1**.

Quality of life of the study group

Objective quality of life of all participants was assessed using the QUALEFFO -41 scale and subjective quality of life was assessed using the WHOQOL-100 upon the first measurement (before alendronate therapy) and upon the second measurement after 3 months.

The results concerning the QoL with regard to specific domains of the QUALEFFO-41 scale were presented based on mean values (SD). In both the first and the second survey, the patients obtained high mean scores for pain (42.12 vs. 41.32), social function (46.40 vs. 46.45), health perception (60.88 vs. 62.51) and emotional function (41.11 vs. 41.42). Statistically significant differences between the measurements were noted for pain ($p < 0.01$) and health perception ($p < 0.01$) (**Table 2**).

Moreover, mean values of women who used bisphosphonates were significantly lower than those of subjects not treated with bisphosphonates in the following areas: pain ($p = 0.03$), activities of daily living (ADL) ($p = 0.03$), jobs around the house ($p = 0.01$), mobility ($p = 0.01$), health perception ($p = 0.03$), emotional function ($p = 0.007$) and general quality of life ($p = 0.005$). A statistically significant difference was not observed for social function (**Table 3**). Similarly, the subjective quality of life is presented as mean values

Table 1. Demographic and clinical characteristics of studied subjects (n = 102)

Parameter	Value
Age, mean (SD) [years]	65.09 (5.6)
Age at menopause, mean (SD) [years]	50.70 (4.6)
Body Mass Index (BMI), mean (SD) [kg/m²]	21.90 (3.2)
Education, n (%)	
Basic	3 (2.9)
Work-related	14 (13.7)
Secondary	58 (56.9)
University level	27 (26.5)
With family or with another, n (%)	75 (73.5)
Paid work, n (%)	26 (25.5)
Current physical activity, n (%)	61 (59.8)
Current smoking, n (%)	16 (15.7)
BMD L_1-L_4 (g/cm²), mean (SD)	0.82 (0.07)
T-score L_1-L_4, mean (SD)	-2.99 (0.34)
BMD femoral neck (g/cm²), mean (SD)	0.61 (0.07)
T-score femoral neck, mean (SD)	-2.98 (0.34)
Previous non-vertebral fractures, n (%)	27 (26.5)
Parental history of fracture, n (%)	37 (36.3)
Osteoporosis, n (%)	80 (78.4)
10-year probability of fracture risk for women with osteoporosis and with 1 factor for 67 women (%)	14
Osteopenia, n (%)	22 (21.6)
10-year probability of fracture risk for women with 1 factor for 35 women (%)	5.9
Osteoporosis treatment, n (%)	
Weekly alendronate	67 (65.7)
Without bisphosphonates therapy	35 (34.3)

Table 2. Quality of life of postmenopausal women with reduced bone mineral density (n = 102). Measurement I - assessment at inclusion; Measurement II – assessment after three months of study. Data are presented as means (SD)

QUALEFFO-41	Measurement I	Measurement II	p
Pain (back pain, sleep disturbance)	42.12 (29.98)	41.32 (31.11)	< 0.01
ADL (activities of daily living)	19.2(12.21)	19.22(12.85)	N.S
Jobs around the house	28.3(13.43)	28.32(13.55)	N.S
Mobility (standing up, bending, kneeling, stairs, walking, body image)	23.37 (15.31)	23.42 (15.30)	N.S.
Social function (sport, gardening, hobby, friends)	46.42 (22.32)	46.45 (22.32)	N.S.
General health perception	60.88 (24.33)	62.51 (22.84)	< 0.01
Emotional function (fatigue, depression, loneliness, energy, cheerfulness, hope, fear)	41.11 (13.78)	41.42 (13.03)	N.S.
Total QUALEFFO-41 score	28.89 (11.81)	29.02 (11.66)	N.S.

Higher scores indicate poorer QoL; N.S. – not significant

for specific areas of the WHOQOL-100 scale. In both the first and the second survey, high mean values were noted for the social domain (14.16 vs. 14.15) and overall subjective assessment of quality of life (15.46 vs. 15.45). A statistically significant difference between the measurements was observed for the mental function (**Table 4**).

The mean values in individual domains of the WHOQOL-100 scale did not significantly differ between patients treated with bisphosphonates and women not receiving such therapy. An exception was the level of independence, with mean values of osteoporotic women not receiving bisphosphonates being significantly higher than those of patients using bisphosphonates therapy (p = 0.04) (**Table 5**).

Table 6 shows the factors associated with total QoL for women by logistic regression analysis, using the QUALEFFO-41 and WHOQOL-100. For the total QUALEFFO-41 score, the associated factors were: age (OR = 1.56; 95% CI 1.39–1.45) secondary and higher education (OR = 0.59; 95% CI 0.4–0.85), physical activity (OR = 0.55; 95%CI 0.32–0.97), bisphosphonates therapy (OR = 0.41; 95% CI 0.13–0.71). For the total WHOQOL-100 score the associated factors were: age (OR = 0.43; 95% CI 0.23–0.98) and BMI ≥ 25 (kg/m^2), (OR = 0.85; 95% CI 0.73–0.99).

Table 3. Comparison of quality of life after three months of treatment with bisphosphonates in postmenopausal women and among those not receiving such therapy. Data are presented as means (SD)

QUALEFFO-41	Women treated with bisphosphonates (n = 67)	Women not treated with bisphosphonates (n= 35)	p
Pain (back pain, sleep disturbance)	34.31 (29.87)	46.16 (29.50)	F = 4.71; *p* = 0.03
ADL (activities of daily living)	15.09 (12.11)	21.32 (12.32)	F = 4.94; *p* = 0.03
Jobs around the house	20.2 (18.44)	31.61(20.01)	F = 6.57; *p* = 0.01
Mobility (standing up, bending, kneeling, stairs, walking, body image)	17.53 (11.86)	26.39 (16.09)	F = 6.85; *p* = 0.01
Social function (sport, gardening, hobby, friends)	41.60 (19.80)	48.90 (23.27)	N.S.
General health perception	52.80 (26.72)	65.03 (22.2)	F = 4.99; *p* = 0.03
Emotional function (fatigue, depression, loneliness, energy, cheerfulness, hope, fear)	52.90 (26.66)	65.03 (22.16)	F = 7.78; *p* = 0.007
Total QUALEFFO-41 score	23.97 (10.90)	31.44 (11.52)	F= 8.31; *p* = 0.005

Higher scores indicate poorer QoL, N.S. – not significant

Table 4. Quality of life of postmenopausal women with osteoporosis (n = 102). Measurement I – assessment at inclusion; Measurement II – assessment at 3 months. Data are presented as means (SD)

WHOQOL-100	Measurement I	Measurement II	p
Physical function	12.44 (1.13)	12.43 (1.75)	N.S.
Mental function	13.18 (1.24)	13.04 (1.11)	N.S.
Level of independence	13.72 (1.66)	13.72 (1.51)	N.S.
Social function	14.16 (2.17)	14.15 (1.92)	N.S.
Environment	13.55 (1.36)	13.55 (1.25)	N.S.
Spirituality	13.67 (3.55)	13.64 (3.67)	N.S.
Total WHOQOL-100 score	14.78 (2.62)	14.78 (2.19)	N.S.

Higher scores indicate better QoL, the points range: 4–20

Table 5. Comparison of subjective quality of life of women treated with bisphosphonates and those not receiving such therapy. Data are presented as means (SD)

WHOQOL-100	Women treated with bisphosphonates n = 67	Women not treated with bisphosphonates n = 35	p
Physical function	12.41 (1.17)	12.45 (1.12)	N.S.
Mental function	13.12 (1.02)	13.20 (1.60)	N.S.
Level of independence	13.45 (1.59)	14.24 (1.71)	F = 4.57; *p = 0.04*
Social function	13.85 (1.99)	14.76 (2.40)	N.S.
Environment	13.38 (1.15)	13.38 (1.11)	N.S.
Spirituality	13.32 (3.25)	13.34 (4.04)	N.S.
Total WHOQOL-100 score	15.46 (3.52)	15.45 (3.52)	N.S.

Higher scores indicate better QoL, the points range: 4–20

Table 6. Variables associated with total QUALEFFO-41 and total WHOOQL-100 in women with reduced BMD evaluated by stepwise multiple logistic regression analysis (n = 102)

	Variables	*p* -Value	OR	95% CI
Total QUALEFFO-41 score > 25.0	Age	0.02	1.56	1.39 1.45
	Secondary and higher education	0.005	0.59	0.4 0.85
	Physical activity	0.037	0.55	0.32 0.97
	Bisphosphonates therapy	0.01	0.41	0.23 0.71
Cox i Snell R^2 = 0.44 Nagelkerke R^2 = 0.51				
Total WHOOQL-100 score < 17.0	Age	0.04	0.43	0.23 0.98
	BMI ≥ 25 (kg/m^2)	0.03	0.85	0.73 0.99
Cox i Snell R^2 = 0.14 Nagelkerke R^2 = 0.34				

Discussion

Assessing the quality of health life has been recognized as an important determinant of the clinical evolution of patients with reduced BMD and its serious consequences, such as osteoporotic fractures.

That is why in this study we analyzed changes in the quality of life in postmenopausal women with reduced BMD observed during the three-months therapy of bisphosphonates. For this purpose, we used QUALEFFO--41 questionnaire, consisting of 41 grouped questions, that have already been prepared for use in Poland and WHOQOL-100 consisting of 100 grouped questions [22, 24].

Analysis of data from two measurements showed that the objective quality of life in pain in women improved (change to the significance level $p < 0.01$). The observed improvement in the perception of pain may be the result of therapeutic effects. In the second measurement of quality of life compared with the results and the measurement has not changed in terms of physical and social functioning. Also, no changes were observed in the evaluation of emotional state, unlike in the studies Dennison et al [25], who reported deterioration in emotional functioning in women with postmenopausal osteoporosis. The observed differences in the assessments may result from the length of observation. In studies conducted by Dennison et al [26] study was repeated after four years while ours after 3 months.

A disturbing fact is that in the second measurement of the subjects obtained a lower quality of life in terms of the perception of health. The reason for this require additional research. Reduced perception of health status could result from other aspects of the postmenopausal period. An analysis of data from the two measurements showed that the subjective quality of life assessed on the basis of the scale WHOQOL-100 in all areas of the scale has not changed.

In our studies in the assessment of the impact of alendronate therapy demonstrated a significant reduction in back pain ($p = 0.03$), as in the reports Iwamoto et al. [27] which inform about the positive effects of alendronate sodium therapy on back pain. Like Panico et al. [28] in our study we observed a significant improvement in physical functioning. Panico et al. well as getting good grades emphasize the quality of life in terms of activities of daily living, mobility and range of household activities compared to the patients treated with alendronate [28].

In addition, women who used alendronate were characterized by significantly higher quality of life in the area of emotional, better perception of their health and higher overall quality of life. Similarly, a Brazilian cross-sectional study by Ferreiro et al. [29] and studies conducted by Iwamoto et al. [27] showed that antiosteoporotic therapy significantly improved quality of life of the participants.

Subjective quality of life in all areas of the scale of women treated with bisphosphonates did not differ significantly in comparison with assessments of quality of life among untreated women. The exception here is the independence of participants, in which the subjective quality of life was lower in women who took bisphosphonates, compared to a group of women not taking these drugs.

Perhaps this is related to the need to comply with very favorable rules for the application of drugs. Bisphosphonates therapy entail the receiving the drug on an empty stomach (half hour before eating, drinking boiled water, with the recommendation of walking, do not go to bed). This procedure creates inconvenience for the patient. Perhaps that is why in the assessment of subjective quality of life in the area of independence was statistically significantly lower compared to the quality of life of women who were not taking bisphosphonates.

Our results showed the quality of life of patients treated with bisphosphonates was superior to that of women not receiving such therapy. The participants using alendronate scored significantly better with regard to pain,

their physical and social function was significantly superior as well as health perception and overall quality of life. The present study, as well as that of Iwamoto et al. [27], showed a positive correlation between bisphosphonates therapy and physical activity and QoL. According to Iwamoto et al. [27] alendronate and physical activity rapidly decreased back pain and improved quality of life in postmenopausal women with osteoporosis. Flood et al. [13] evaluated satisfaction with bisphosphonates therapy among osteoporotic and osteopenic patients using The Osteoporosis Patient Satisfaction Questionnaire (OPSAT-Q). Approximately 60% of subjects used alendronate sodium once a week and 13% of patients took this drug once a day. Moreover, 20% of participants received risendronate sodium once a week and 6% of subjects took risendronate sodium once a day. While evaluating satisfaction with bisphosphonates therapy, the patients referred to benefits from the treatment, such as effectiveness of the therapy ("noticeable effects", "disease progress has been stopped"), absence of adverse effects and ease of the medicine use. On the other hand, the respondents were dissatisfied with difficulty to observe an improvement in the state of bones and problems with memorising the name of the medicine.

Different conclusions may be drawn from a study by Sezer et al. [30], who did not find a correlation between the quality of life measured using the QUALEFFO-41 scale and the manner of osteoporosis treatment.

While assessing satisfaction with bisphosphonates therapy, patients stress inconvenience associated with the rules of the medicine administration. Patients who follow recommendations concerning the bisphosphonates use show good tolerance of the therapeutic agents. However, bisphosphonates may cause local irritation of the mucosa in the upper gastrointestinal tract, nausea, dyspepsia or diarrhoea. There have been cases of oesophagitis, ulcers or oesophageal erosion. Such complications affect patients who do not follow recommendations concerning the bisphosphonates use. The main reasons for discontinued treatment were digestive events, problem with receiving prescriptions within the first 3 months of treatment, dissatisfaction with the clinical condition. Patients on bisphosphonates may not be adherent to the therapy due to complex dosing regimens and a slightly decreased gastrointestinal tolerance, affecting the patients' quality of life. Several studies reported increased patient adherence related to a decreased frequency of bisphosphonates dosing [31]. Moreover, data showed that a decreased dosing frequency was more convenient and for the majority of patients [32].

Limitations of this study. An important limitation of the study is absence of data on patients' compliance with recommendations concerning the medicine use. Information was also not collected on adverse effects of bisphosphonates treatment. Therefore, continuation of the study will take into account these aspects.

Conclusions

The objective quality of life of osteoporotic women receiving alendronate sodium was significantly superior to that of subjects without such treatment in all domains of the scale (except for the social function).

The subjective quality of life did not significantly differ between the groups, except for the level of independence, which was significantly higher among women not receiving bisphosphonates therapy.

Quality of life assessment of women with osteoporosis and osteopenia using a specific scale can be a valuable clue in the planning of treatment, nursing care and psychological care. This is the first study of Polish women treated with bisphosphonates suffering from osteoporosis and osteopenia using the scale QUALEFFO-41 and WHOQOL-100 accordance with the concept of quality of life of the conditioned state of health.

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Conflict of interest statement
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