



## Research Article

# Vertebral pain syndrome and physical performance assessing in older women with vertebral fractures

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**Keywords:** Vertebral fracture; Osteoporosis; Pain; Physical performance; Women

## Abstract

The purpose of this study was to assess the peculiarities of vertebral pain syndrome, parameters of physical performance and quality of life indices in women of older age depending on the presence of vertebral fractures (VF). This study was performed with participation of 215 women aged 50-89 years old which were divided into two groups: first one-women without any previous osteoporotic fractures (n=143), second group - patients with VF in thoracic and/or lumbar spine (n=72).

The presence and intensity of pain in the thoracic and lumbar spine were evaluated using the 11-component visual analog scale (VAS), physical performance-with following functional tests: 3-, 4- and 15-meter tests (gait speed), static balance (a side-by-side position, a semi-tandem position and a full-tandem position), 8-feet test and «five timed chair stands» (coordination and strength), hand grip strength (by dynamometer), measurement of arterial pressure (systolic and diastolic), heart and respiratory rates, breath holding, chest excursion (mean and on the inhalation and the exhalation), lateral trunk lean, Schober and Thomayer tests.

It was demonstrated that the intensity of vertebral pain (pain at the time of investigation, the most common level of pain, pain in the best periods of the disease) and some physical performance tests (lateral trunk lean and chest excursion (mean index, during the inhalation and exhalation), hand grip strength, 15-meter gait speed test and five-repetition sit-to-stand test) are significantly worse in women with VF than corresponding parameters in persons without fractures. It should be taken into account during the assessment of physical performance and development of rehabilitation programs for older age women with vertebral fractures.

## Introduction

Nowadays, vertebral fractures (VF) are one of the frequent and severe complications of systemic osteoporosis, which lead to severe spine pain, restriction of physical activity, increased disability and mortality [1,2]. Numerous studies have confirmed that VF increase the risk of new vertebral and nonvertebral fractures in postmenopausal women [3,4]. In addition, the risk of future VF is also associated with the number of previous VF and the severity of the vertebral deformities [5,6]. Taking into account the important medical and social consequences of VF and their crucial role in the development of the «cascade of osteoporotic fractures», in recent European and American guidelines for management of postmenopausal osteoporosis in women, fracture of the vertebral body is an independent parameter for induction of osteoporotic treatment [7,8]. Back pain at patients with osteoporosis is one of the important clinical manifestations of osteoporosis. In particular, lower back pain in combination with low bone mineral density (BMD) is the most common type of pain, especially in older people. Patients with VF have an increased risk of back pain (relative risk-1.2-4.2), but only one third of VF is accompanied by pain syndrome [2,9]. Vertebral fractures are often asymptomatic, they are not diagnosed on time and patients do not receive

antiosteoporotic treatment. Pain syndromes lead to restriction of physical activity of patients [10-16], which negatively affects the disease progression and life expectancy, especially given the fact that immobilization and low level of physical activity are independent risk factors of osteoporosis and its complications.

The aim of the study was to assess the peculiarities of vertebral pain syndrome, parameters of physical performance and quality of life indices in women of older age depending on the presence of vertebral fractures.

## Material and Methods

We utilized a cross-sectional research design. The study was conducted at the D.F. Chebotarev Institute of Gerontology NAMS Ukraine (Kyiv) and approved by Ethics Committee of the Institute. All patients signed informed consent for participation in the study and conservative treatment of osteoporosis in the institute clinic. We examined 215 women aged 50-89 years old (50-59 years - 37 persons, 60-69 - 55 women, 70-79 - 115 persons, 80-89 - 8 patients). Women were divided into two groups: first one women without any previous osteoporotic fractures (n=143), second group - patients with VF in thoracic and/or lumbar spine (n=72). It was found that examined patients did not differ significantly in parameters of age, age of menarche and menopause, duration of the postmenopausal period. However, patients with VF had significantly lower indices of height, weight and body mass index (BMI). In addition, reliable deterioration of BMD parameters of all examined sites (lumbar spine, femoral neck, radius and total body) was established. Clinical characteristics of patients are presented in table 1. The presence and intensity of thoracic and lumbar pain syndrome were evaluated using 11-component Visual Analog Scale (VAS). We measured pain intensity in scores of 0 to 10 during the last week before the survey. Quality of life was measured by EuroQul-5D questionnaire. All women completed the questionnaires independently after a preliminary explanation by the researcher.

Moreover, the research tool consisted of a series of following functional tests.

Gait speed was measured by 3-, 4- and 15-meter tests. Results of these tests were the time which it took patients to walk these distances along a corridor. The best performance achieved in two walks at the participant's usual pace along a corridor 3-, 4- or 15 meters long was recorded in meters/sec. Participants were allowed to use any additional devices (canes, walkers etc.) [17,18]. Static balance ability was measured by 3 increasingly difficult standing balance tests. Participants were asked to maintain their balance in three different positions (a side-by-side position (SBSP), a semi-tandem position (STP), and a full-tandem position (FTP)). The time taken to complete the test was recorded in seconds [17]. Coordination and strength was measured by «five timed chair stands» test and recorded in seconds. Participants were asked to stand up and sit down five times as quickly as possible, with their hands folded across their chest. Also 8-feet test was measured (patient goes ahead and places one foot in front of the other,

**Table 1:** Clinical characteristics of women depending on the presence of vertebral fractures.

Index / Group	Without any fractures	With vertebral fractures	t	p
Age, years	68.53±7.94	68.16±7.37	0.33	0.74
Height, m	1.57±0.06	1.55±0.07	2.17	0.03
Weight, kg	76.57±14.50	69.93±13.17	3.26	0.001
Body mass index, kg/m <sup>2</sup>	30.76±5.46	28.75±4.61	2.67	0.008
Age of menarche, years	13.86±1.52	13.74±1.62	0.52	0.61
Age of menopause, years	48.51±5.18	48.65±4.42	0.19	0.85
Duration of postmenopausal period, years	20.42±8.16	19.77±7.79	0.55	0.58
BMD of lumbar spine (L <sub>1</sub> -L <sub>4</sub> ), g/cm <sup>2</sup>	1.06±0.22	0.89±0.23	5.43	0.0000001
BMD of femoral neck, g/cm <sup>2</sup>	0.83±0.14	0.72±0.11	5.93	0.0000001
BMD of total radius, g/cm <sup>2</sup>	0.57±0.10	0.49±0.10	5.25	0.0000001
BMD of total body, g/cm <sup>2</sup>	0.91±0.15	0.79±0.13	5.86	0.0000001

**Note:** Data presented as mean ± SD.

heel to toe for 8 feet. The ability to perform this test reflects the patient coordination) [17,18]. In addition, physical examination was performed and included the measure of arterial pressure (systolic and diastolic, mm Hg), heart and respiratory rates (n/sec), breath holding (sec), chest excursion (mean and on the inhalation and the exhalation, lateral trunk lean, cm) and assessment of Schober and Thomayer tests (cm). Chest excursion [19,20] was measured by centimeter on the level of 4<sup>th</sup> ribs. In addition, thoracic excursion was metered at maximal inhalation and exhalation. Usually the chest circumference difference between the maximal inhalation and exhalation is 6-8 cm. Schober test [21,20] reflects the limitation in the lumbar spine and measures the patient's ability to flex the lower back. Investigator finds L<sub>5</sub> of the lumbar vertebrae, puts a dot, measures upwards 10 cm and makes a second dot. After patient leaning forward without bending the knees the second measure of distance between 2 dots is performed. Decrease of the distance less than 4-5 cm gives the evidence about spine limitation.

Thomayer test [20], evaluates the overall mobility of spine. This test, as a previous one, is done with the patient standing straight. Investigator measures the distance from the end of the 3<sup>d</sup> finger outstretched arms to the floor with maximum inclination ahead. The normal result is 0 and it increases when bending of a spine is restricted. Hand grip strength was measured by the amount of static force that hand can squeeze around a dynamometer and recorded in kilograms [22]. Bone mineral density of lumbar spine, femoral neck and total radius were measured using the dual-energy X-ray absorptiometry (DXA) method (Prodigy, GE Lunar, Madison, 2005, USA). The statistical analysis was carried out using the methods of descriptive statistics, Student's t-test for independent variables and one-way analysis of variance (ANOVA), Pearson and Spearman correlations for parametric and nonparametric variances. All parameters are represented at mean (M)±standard deviation (SD). Software's packages of "Statistica 6.0" Copyright© StatSoft, Inc. 1984-2001 were used during the analysis.

## Results

Analysis of our results showed the significant influence of age on variability of vertebral pain intensity at lumbar spine (for most common level of pain -  $F=7.97$ ;  $p=0.00006$ ) and its absence at thoracic spine ( $F=0.56$ ;  $p=0.63$ ) in women without any previous fractures. In contrast to these results we did not find any reliable influence of age on parameters of pain intensity at thoracic (for most common level of pain -  $F=0.37$ ;  $p=0.77$ ) and lumbar ( $F=0.94$ ;  $p=0.42$ ) spine in patients with VF. Assessment of VAS parameters in women depending on the presence of VF showed the reliable differences in some indices of the pain severity at thoracic and lumbar spine (Table 2). Indices of pain at the time of investigation, most common level of pain, pain in the best periods of the disease at thoracic and lumbar spine in patients with VF were significant higher than parameters in women without any previous fractures. Other parameters of

**Table 2:** Intensity of vertebral pain (according 11 component VAS) at thoracic and lumbar spine in women of older age group depending on the presence of vertebral fractures, cm.

Index / Group	Thoracic spine				Lumbar spine			
	Without any fractures	With vertebral fractures	t	p	Without any fractures	With vertebral fractures	t	p
Pain at the time of investigation	1,60±2,35	2,42±2,84	2,14	0,03	4,12±2,28	4,77±2,07	1,95	0,05
The most common level of pain	1,24±1,84	2,11±2,59	2,73	0,007	3,42±2,00	4,13±1,98	2,33	0,02
Pain in the best periods of the disease	0,79±1,26	1,29±1,83	2,26	0,02	2,17±1,66	2,76±1,76	2,30	0,02
Pain in the worst periods of the disease	2,36±3,38	3,31±3,74	1,78	0,08	6,11±2,81	6,66±2,35	1,35	0,18
Start pain	0,99±1,55	1,50±2,22	1,88	0,06	2,74±1,89	3,21±2,26	1,53	0,13
Pain during long walking	1,64±2,49	2,34±2,86	1,77	0,08	4,34±2,31	4,79±2,18	1,30	0,19
Pain during long rest (at night)	0,97±1,58	1,21±1,80	0,95	0,34	2,52±2,08	2,55±1,89	0,09	0,93
Permanent (continuous) pain	1,08±1,73	1,45±2,19	1,29	0,19	2,94±2,11	3,11±2,11	0,55	0,58
Pain when walking up the stairs	1,45±2,31	1,87±2,40	1,18	0,24	4,10±2,37	4,27±2,07	0,49	0,63
Pain when walking down the stairs	1,33±2,15	1,81±2,39	1,42	0,16	3,65±2,27	3,98±2,16	0,97	0,33
Pain when walking on a flat surface	1,34±2,11	1,58±2,19	0,74	0,46	3,71±2,22	3,84±2,24	0,39	0,70

Note: Data presented as mean ± SD.

VAS did not differ at thoracic and lumbar spine depending on previous VF. In addition, current study showed the significant influence of age on variability of parameters of life quality in patients with VF ( $F=3.90$ ;  $p=0.013$ ) and women without any previous fractures ( $F=10.04$ ;  $p=0.000005$ ). Moreover, the significant correlation between intensity of thoracic pain at the time of investigation and BMD indices at lumbar spine ( $r=-0.21$ ,  $p=0.01$ ), femoral neck ( $r=-0.21$ ,  $p=0.01$ ), total body ( $r=-0.22$ ,  $p=0.007$ ) and quality of life ( $r=-0.18$ ,  $p=0.03$ ) was found, but no parameters of physical performance in women without previous fractures. In patients with VF intensity of thoracic pain at the time of investigation reliably correlated with parameters of lateral chest lean ( $r=-0.31$ ,  $p=0.02$ ), breath holding ( $r=-0.33$ ,  $p=0.02$ ), heart rate ( $r=0.30$ ,  $p=0.03$ ) in the absence of relationship with BMD and quality of life parameters.

Intensity of lumbar pain at the time of investigation significantly correlates with lateral chest lean ( $r=-0.21$ ,  $p=0.01$ ), hand grip strength ( $r=-0.18$ ,  $p=0.04$ ) and quality of life ( $r=-0.22$ ,  $p=0.008$ ) indices in women without previous fractures. In contrast, in patients with VF we did not find any reliable correlations between severity of lumbar pain at the time of investigation and BMD and physical performance indices, except for correlation with quality of life result ( $r=0.37$ ,  $p=0.053$ ). Analysis of the influence of age on physical performance parameters in the patients regarding VF found no significant effect on the variability of Schober, Tomayer tests and chest excursion, blood pressure, respiratory and heart rates regardless of VF. In contrast, according to the one-way Anova analysis, age had a significant impact on the variability of the distance of lateral trunk lean and hand grip strength tests in women without any previous fractures ( $F=4.87$ ;  $p=0.003$  and  $F=4.58$ ;  $p=0.004$ ) in the absent of any influence in patients with vertebral fractures. Similar results were obtained according to the results of 4-meter test ( $F=3.15$ ,  $p=0.03$  in women without fractures and  $F=2.42$ , respectively,  $p=0.07$ ).

Also, the current study showed significant differences in parameters of lateral trunk lean and chest excursion (mean index, during the inhalation and exhalation) depending on the presence of VF in women aged 50-89 years. All these indices were higher in women without fractures. In contrast, we did not find any significant differences of Schober or Tomayer tests depending on the presence of previous VF. In addition, parameter of hand grip strength test in patients with previous VF was lower than correspondent in women without fractures (accordingly  $13, 55 \pm 7, 99$  vs  $16, 42 \pm 9, 39$  kg,  $p=0.03$ ). All other studied indices of physical performance probably did not differ in group depending on the presence of VF (Table 3).

During the analyses of gait speed parameters, significantly higher indices of 15-meter test in patients with VF in comparison with indices in women without previous fractures were established. However, we did not establish any reliably

**Table 3:** Indices of physical performance in women of older age group depending on the presence of vertebral fractures, cm.

Index / Group	Without any fractures	With vertebral fractures	t	p
Tomayer test, cm	6,76±12,38	9,51±15,40	1,36	0,18
Schober test, cm	4,19±2,55	3,64±2,94	1,37	0,17
Lateral trunk lean, cm	14,33±4,80	12,05±4,19	3,30	0,001
Chest excursion, cm	106,61±11,19	102,80±9,41	2,39	0,02
Chest excursion during the inhalation, cm	108,92±11,12	104,62±9,54	2,70	0,007
Excursion of the chest on the exhalation, cm	104,51±11,32	101,18±9,47	2,07	0,04
Respiratory rate (frequency for 1 minute), n	17,13±2,87	17,66±3,08	1,21	0,23
Breath holding, sec	21,42±7,70	20,14±10,04	1,01	0,31
Hand grip strength, kg	16,42±9,39	13,55±7,99	2,14	0,03
Five-repetition sit-to-stand test, sec	13,37±6,12	16,09±8,30	2,64	0,009
3-meter gait speed test, m/sec	9,49±3,43	10,17±3,61	1,30	0,20
4-meter gait speed test, m/sec	5,54±2,27	5,76±2,08	-0,68	0,50
15-meter gait speed test, m/sec	14,63±5,04	16,23±5,89	2,02	0,04

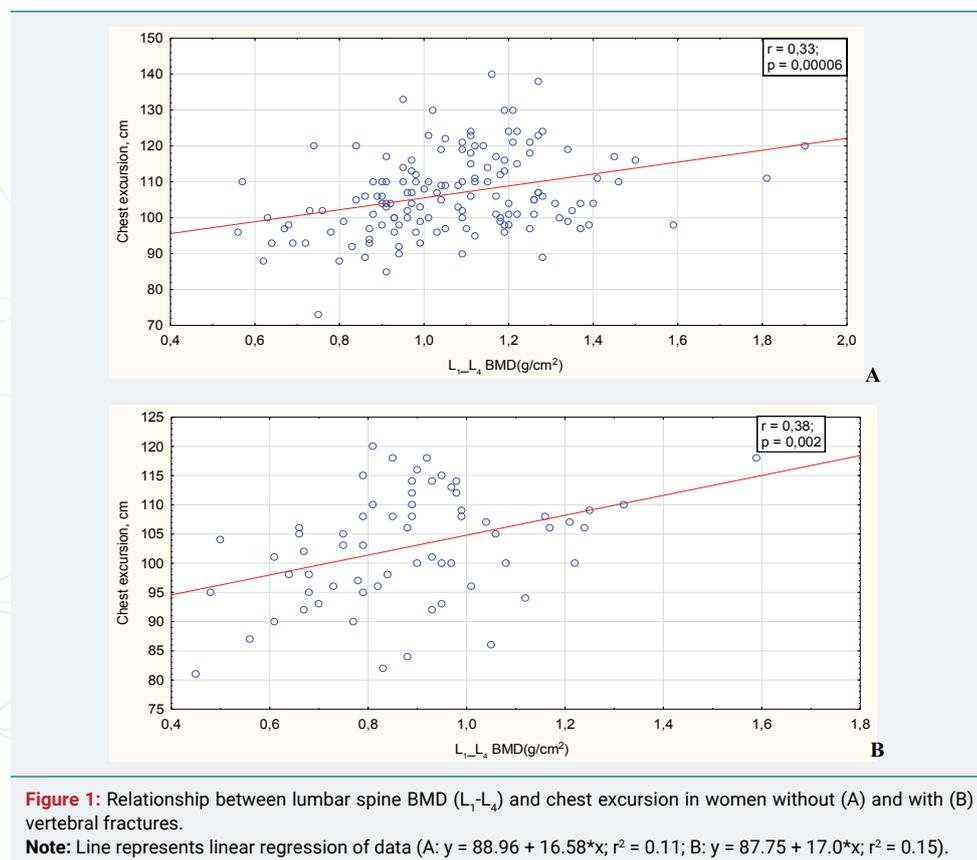
**Note.** Data presented as mean ± SD.\* - significant differences ( $p<0.01$ ) comparing to women without any previous fractures.

differences in parameters of 3- or 4-meter tests depending on presence of VF. Moreover, the significant correlations between lumbar spine BMD and mean parameters of chest excursion ( $r=0.33$ ,  $p=0.0001$ ), chest excursion during the inhalation ( $r=0.30$ ,  $p=0.0005$ ) and chest excursion on the exhalation ( $r=0.32$ ,  $p=0.0002$ ) in women without previous fractures were found. Also we established the significant correlations between lumbar spine BMD and mean parameters of chest excursion ( $r=0.38$ ,  $p=0.002$ ), chest excursion during the inhalation ( $r=0.37$ ,  $p=0.008$ ) and chest excursion on the exhalation ( $r=0.40$ ,  $p=0.004$ ) in women with previous VF (Figure 1).

Indices of quality of life significantly correlated with lateral trunk lean ( $r=-0.22$ ,  $p=0.009$ ), hand grip strength ( $r=-0.20$ ,  $p=0.02$ ), 4-meter test ( $r=0.19$ ,  $p=0.03$ ), 8-foot test ( $r=-0.19$ ,  $p=0.03$ ), STP test ( $r=-0.18$ ,  $p=0.04$ ), systolic ( $r=0.23$ ,  $p=0.006$ ) and diastolic ( $r=0.20$ ,  $p=0.006$ ) blood pressure in women without previous fractures. In contrast, we demonstrated the significant correlation only between quality of life indices and results of lateral trunk lean ( $r=-0.33$ ,  $p=0.02$ ) and 4-meter test ( $r=0.32$ ,  $p=0.02$ ) in women with previous VF. Test of static balance SBSP could not perform 4.8% women without fracture and 3.1% with VF, test in STP - 13.9 and 13.9% women accordingly, test in FTP - 34.0 and 46.2%, 8-foot test - 49.3 and 55.4% women accordingly ( $p>0.05$ ).

## Discussion

Nowadays, VF are serious complications of systemic osteoporosis [1,2,10]. According to the literature, their prevalence in the adult population ranges from 6.2 to 20.7% and depends on the region of residence. Approximately 750 000 new VF are registered in the United States every year among people over 50 years old, and in a quarter of them at least one other vertebral fracture happened during their lifetime. The frequency of VF related to systemic osteoporosis exponentially increases with age. According to WHO data, about 25% of women under 65 already have compression fractures of vertebral bodies. Although VF are often asymptomatic, thoracic or low back pain is one of the most common clinical manifestations of VF.



Vertebral pain in the spine may be associated not only with spine fractures, which is related with systemic osteoporosis, but also with other causes and factors, including different diseases of bone and muscular system (spinal osteochondrosis, scoliosis, etc.), chest, stomach and pelvis, as well as other individual, professional and hormonal risk factors [23]. Thus, Schiphorst Preuper H.R. et al. [24] found that the relative risk of thoracic pain is 5.2 in men (95% confidence interval (CI): 3.9-6.6) and 10.0 (95% CI: 7.8-12.1) in women. The frequency of thoracic pain in men is related to age (odds ratio (OR) – 6.0 (95% CI: 2.1-17.3) in persons 50 years and older), height (OR – 2.2 (95% CI: 1.2-3.9)), frequent static body inclination (OR – 3.0 (95% CI: 1.5-6.1)), lack of recovery periods (OR – 2.0 (95% CI: 1.2-3.6)) and driving of different vehicles (OR – 2.8 (95% CI: 1.4-5.5)). However, it was also found that excessive body weight and obesity are associated with lower risk (OR – 0.5 (95% CI: 0.3-0.96)). In contrast, risk of thoracic pain in women was associated with excessive physical activity (OR – 1.9 (95% CI: 1.1-3.3)) [24].

The results of 52 studies from 65 cohorts found that the frequency of thoracic pain varied within the range of 3.0-55.0%. The individual (female gender, peculiarities of musculoskeletal system development, premenstrual syndrome or postmenopausal), as well as professional (physical labor, high labor intensity, ergonomic problems in the workplace, duration of employment, driving of specialized vehicles) and psychosocial factors (the alleged risk of injury, high psychological stress) increase this risk [23]. Other authors have proved that vertebrate fractures lead not only to the development of pain syndromes, but also to a significant limitation of physical activity [12,14,16].

In addition, the deterioration of the functional capacity is also associated with the number of previous VF and their severity. Thus, it was demonstrated [25] that walking speed in women with two or more compression fractures was significantly slower than that in persons without VF (correspondingly 1.17 and 1.24 m/sec,  $p=0.03$ ; results were adjusted for age, body mass index, back pain level, number of pain joints, the number of concomitant diseases and level of regular physical activity). Women who had two or more VF had significantly higher ( $p=0.01$ ) results of the <<chair stand time>> test (assessment of lower extremity strength) and significantly lower ( $p=0.01$ ) test of functional reach (measure of balance and posture which was calculated as the difference between two measurements (average of three trials) as follows: subjects first stood comfortably upright, facing forward, hand in a fist, with their arm extended next to a yardstick mounted on a wall [25]) compared to the corresponding indices of women without fractures. However, the authors did not establish the significant differences of these tests in women with one compression fracture comparing with persons without fractures.

According current literature data, low bone mineral density [13,26,27] and increased risk of fall [28,29] are connected with impaired physical performance and both of them increase the risk of future VF. In addition, it was demonstrated early, that, regular exercises are effective non-pharmacological measures in prevention of bone loss and osteoporotic fractures [29-31]. Nowadays, the different tests of physical performance are use for assessment of balancing, coordination, muscle strength and risk of fall in patients with osteoporosis and its complications [14,16,26,28]. Thus, the literature data show that vertebral pain syndrome and associated restriction of physical activity in patients with osteoporosis and its complication (VF) adversely affects the disease progression and life expectancy, as immobilization or low level of physical activity are independent factors of the risk of accelerated bone loss, falls and fractures. The present study sought out to establish the peculiarities of thoracic and lumbar pain, parameters of physical performance and quality of life indices in women of older age depending on the presence of vertebral fractures.

The results of our study showed the significant influence of age on variability of vertebral pain intensity at lumbar spine and its absence at thoracic spine in women

without any previous fractures. However, we did not find any reliable influence of age on parameters of pain intensity at thoracic and lumbar spine in patients with VF. These differences may be associated with the development of degenerative changes in the lumbar spine in persons without fractures and their effect on the vertebral pain severity, which requires further study. Moreover, age had a significant impact on the variability of some parameters of physical performance (the distance of lateral trunk lean and hand grip strength) in women without any previous fractures in the absence of any influence on these indices in patients with vertebral fractures. Similar results were obtained according to the results of 4-meter test in women without fractures. Analysis of the influence of age on physical performance parameters in the patients regarding VF found no significant effect on the variability of Schober, Tomayer tests and chest excursion, blood pressure, respiratory and heart rates regardless of VF.

Preliminary studies also indicate deterioration in physical performance tests with age without fractures [18,22,32]. During the study of the parameters of physical performances and risk of fall it was demonstrated that parameters of balancing tests (<<tandem>>, <<balancing on one leg>>), gait speed tests (3- 4- and 15-meters tests), 8-feet test, hand grip strength and five-repetition sit-to-stand test were reliably lower in the age groups of 50-59, 60-69, 70-79 and 80-89 years compared with indices of women aged 20-29 [32]. In addition, current study showed the significant influence of age on variability of parameters of life quality in patients with VF and women without any previous fractures. Assessment of VAS parameters in women depending on the presence of VF showed the significant differences in some indices of the pain severity at thoracic and lumbar spine (pain at the time of investigation, the most common level of pain, pain in the best periods of the disease) which were reliably higher in patients with VF than corresponding parameters in women without any previous fractures. Our results confirm the data of previous studies about increase of some parameters of vertebral pain with age [9].

Also, we established the reliable differences in indices of lateral trunk lean and chest excursion (mean index, during the inhalation and exhalation) depending on the presence of VF. All these indices were higher in women without fractures. In contrast, we did not find any significant differences of Schober or Tomayer tests depending on the presence of previous VF. In addition, parameter of hand grip strength in patients with previous VF was lower than corresponding parameters in women without fractures. All other studied indices of physical performance did not differ significantly in group depending on the presence of VF. Our study demonstrated the significant correlations between intensity of thoracic pain at the time of investigation and BMD indices at lumbar spine, femoral neck, total body and quality of life were found, but no parameters of physical performance in women without previous fractures. In patients with VF, intensity of thoracic pain at the time of investigation reliably correlated with parameters of lateral chest lean, breath holding and the heart rate in the absence of relationship with BMD and quality of life parameters.

Intensity of lumbar pain at the time of investigation significantly correlates with lateral chest lean, hand grip strength and quality of life indices in women without previous fractures. In contrast, in patients with VF, we did not find any reliable correlations between severity of lumbar pain at the time of investigation and BMD and physical performance indices, except the correlation with quality of life result. The current study established significantly higher indices of 15-meter test in patients with VF in comparison with parameters of women without previous fractures. However, we did not find any reliable differences in parameters of 3- or 4-meter tests depending on the presence of VF. Moreover, the significant correlations between lumbar spine BMD and mean parameters of chest excursion, chest excursion during the inhalation and chest excursion of the on the exhalation in women without previous fractures were demonstrated. Also we established the significant correlations between lumbar spine



BMD and mean parameters of chest excursion, chest excursion during the inhalation and chest excursion of the on the exhalation in women with previous VF.

In our study, indices of quality of life significantly correlated with lateral trunk lean, hand grip strength, 4-meter test, 8-feet test, STP test, systolic and diastolic blood pressure in women without previous fractures. In contrast, we established the significant correlations only between the quality of life indices and results of lateral trunk lean and 4-meter test in women with previous VF.

In conclusion, the intensity of vertebral pain (pain at the time of investigation, the most common level of pain, pain in the best periods of the disease) and some physical performance tests (lateral trunk lean and chest excursion (mean index, during the inhalation and exhalation), hand grip strength, 15-meter gait speed test and five-repetition sit-to-stand test) are significantly worse in women with VF than corresponding parameters in persons without fractures. It should be taken into account in the assessment of physical performance and development of rehabilitation programs for older age women with vertebral fractures.

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