

# Impact of spinal pain on daily living activities in postmenopausal women working in agriculture

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## Abstract

**Introduction and objective.** Postmenopausal women working in agriculture suffer from spinal pain for two overlapping reasons, the first is related to the menopause and the second to the specificity of rural work, which includes lifting heavy objects and changing weather conditions. Spinal pain affects the daily life of women as well as their ability to work. The objective of the study was to analyse the impact of spinal pain on activities of daily life in Polish postmenopausal women performing agricultural work.

**Materials and method.** The study was conducted in 2016 in Poland and included 1,119 post-menopausal women living in rural areas and working in agriculture. The women assessed the severity of spinal pain in 3 sections: neck, thorax and lumbar. Neck Disability Index (NDI) and Oswestry Low Back Disability Index (ODI) questionnaires were used to assess the impact of spinal pain on daily life activities. Generalized linear models were estimated in statistical analyses.

**Results.** Postmenopausal women working in agriculture suffered most often from pain in the lumbar spine, less frequently in the neck, and the least in the thoracic. The most common was an isolated pain in only one section of the spine. Spinal pain disturbed the most the women's rest, standing, lifting objects, while sleep, concentration, and walking the least. The impact of spinal pain on the activities of daily life, on average, was moderate, and increased with greater pain severity, the earlier the age the pain started, the higher the body weight, the lower education level and if there was a co-existing pain in any of the other spine sections. The impact of spinal pain on daily life activities did not depend on age between 45–65, WHR, age at last menstruation, parity, and number and types of births.

**Conclusions.** The impact of spinal pain on daily life activities in postmenopausal women working in agriculture was assessed as moderate, on average, and depended mainly on spinal pain-related characteristics, such as severity, age at onset and co-existence of pain in any other spinal sections.

## Key words

menopause, spine pain, NDI, ODI

## INTRODUCTION AND OBJECTIVE

Spinal pain is a serious medical and socio-economic problem since its occurrence has a negative psychological impact on the affected person. In turn, neck and low back pains cause personal suffering and interfere with every aspect of daily life, especially during work [1]. The experience of pain, its duration, as well as disabilities associated with pain affect the way of its perception [2]. It is especially important for postmenopausal women because the length of this period of woman's life could last almost one-third of the entire life. A decreased level of oestrogens is related to various disorders, e.g. atherosclerosis, headaches and migraines, joint pain, low back pain, and thinning of tissues.

Postmenopausal women working in agriculture suffer from spinal pain for two overlapping reasons, the first is related to menopause and the second to the specificity of rural work, which includes lifting heavy objects and changing weather conditions (especially cold and drafts). Low back pain affects

the daily life of women working in agriculture (performing all the activities day-after-day with little opportunity for rest), as well as their ability to work (sometimes they must somehow limit lifting or bending, which are common rural activities). Spinal pain often co-exists with other disorders that are common in this age group (e.g. obesity, metabolic syndrome). Obesity causes a hyperextension of the lumbar spine and disc degeneration [3, 4]. It is also related to poor physical functioning, like walking, running and other activities.

The objective of the study was to analyse the impact of spinal pain on the daily life activities in Polish postmenopausal women working in agriculture, based on the Neck Disability Index (NDI) and Oswestry Low Back Disability Index (ODI) questionnaires.

## MATERIAL AND METHODS

**Study group.** The study was conducted in 2016 in Poland. The study group consisted of 1,119 randomly selected postmenopausal women living in rural areas and working in agriculture. The inclusion criteria were: age 45–65, at least 12 months since the last menstrual period, suffering from spinal pain, and responding to more than half of the questions in

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the questionnaires NDI and ODI. The exclusion criteria were: addiction to drugs or alcohol, and diagnosed with a disease entity with the symptoms of dementia. The women were asked about age, date of the last menstrual period, level of education, body weight and height, waist and hips circumference, parity – number and types of births.

**Self-assessment of spinal pain.** The women assessed the severity of spine pain in 3 sections: neck, thorax and lumbar, they were also asked about age at the onset of spinal pain in these sections. The severity of spinal pain was assessed in the VAS (Visual Analogue Scale), a point scale ranging from 0 (no pain) to 10 (the most severe unbearable pain).

**Disability indexes in spinal pain.** Documented questionnaires were used to estimate functional disorders in spinal pain: Neck Disability Index (NDI) and Oswestry Low Back Disability Index (ODI), and ODI occurred in a modified version (the question of sexual dysfunction was replaced by a question about disorders experienced while performing work). ODI and NDI contain 10 items, each one concerning the pursuit of activities of daily life. In this study, the thematic sets of questions from both questionnaires – ODI and NDI – were combined in a single block. In total, the full set of questions concerned 15 activities, including 5 questions occurring in both the ODI and NDI questionnaire, 5 questions occurring only in the ODI and 5 questions occurring only in the NDI (Tab. 1). In the presented study, the overall rate of disability in spinal pain, Total Disability Index (TDI), was also calculated, based on all 15 questions.

**Table 1.** Daily life activities in NDI and ODI

Nr	Activities	NDI	ODI
1	Pain intensity	✓	✓
2	Personal care	✓	✓
3	Lifting	✓	✓
4	Working	✓	✓
5	Sleeping	✓	✓
6	Standing		✓
7	Sitting		✓
8	Walking		✓
9	Travelling		✓
10	Social life		✓
11	Reading	✓	
12	Headaches	✓	
13	Recreation	✓	
14	Driving	✓	
15	Concentration	✓	

Answers to the questions allowed classification of the limited functioning of a patient through each step. Responses are classified within the range 0–5, where 0 is no disturbance of the function, and 5 is its complete dysfunction. Results are presented in a point scale of 0–50 or a percentage scale from 0 (no abnormalities) to 100% (total disorder), and determine the degree of disorder of a patient's disability because of back pain. The percentage is obtained from the conversion according to the formula:

$$\text{ODI (NDI)} = (\text{total points} / \text{number of questions that were answered}) \times 20 [\%].$$

On the basis of the percentage of disorders it is possible to determine the degree of dysfunction (Tab. 2). For the overall rate, mean interval boundaries between NDI and ODI were assumed.

**Table 2.** Degree of function disorder according to ODI and NDI indices

NDI		ODI		TDI	
degree of impairment	%	degree of impairment	%	degree of impairment	%
none	0 – 9	minimal	0 – 20	none	0 – 14
mild	10 – 29	moderate	21 – 40	mild	15 – 34
moderate	30 – 49	severe	41 – 60	moderate	35 – 54
severe	50 – 69	crippled	61 – 80	severe	55 – 74
complete	70 – 100	complete	81 – 100	complete	75 – 100

**Statistical Analysis.** The results were statistically analysed by SAS System software, and figures created in STATISTICA and Excel software. The mean values (M) with standard deviations (SD) for continuous variables, and absolute (n) and relative numbers (%) of items occurrence for categorical variables, were calculated.

The generalized linear models of impairment degree in daily life activities caused by spine pain vs. selected factors were estimated. In generalized linear models, normal distribution was assumed of disability indexes and identity link function. The slope terms (b), i.e. mean change of pain severity caused by unit change of continuous risk factors, or mean difference between the two categories of categorical risk factors, *ceteris paribus*, were estimated.

The value of  $p < 0.05$  is considered as a significant difference.

Informed consent for participation in the study was obtained from the women. The study was approved by the Ethics Committee in the Institute of Rural Medicine in Lublin, Poland.

## RESULTS

**Characteristics of the study group.** 1,119 post-menopausal women working in agriculture and suffering from spinal pain were examined. Most of them were aged 55–59, had secondary education, were obese and abdominally obese, with normal-aged menopause, had borne two children – only vaginal deliveries (Tab. 3).

**Description of spinal pain in the study group.** Analyzing the affected section of spine (Tab. 4), most of the women felt pain in the lumbar (low back) spine, fewer women in the neck spine, and the fewest in the thoracic (chest) spine. The severity of pain was the highest in the lumbar spine, but lower, and similar in the neck and thoracic spine. Pain in the lumbar spine began at an earlier age, while in the neck and thoracic spine – later, and were similar.

Analyzing the number of affected sections of the spine (Tab. 5), the majority of women experienced spinal pain located in one section, fewer women – coexisting pain in two locations, and the fewest women – coexisting pain in all three spinal sections.

**Table 3.** Characteristics of the examined women

Type	Characteristics	Estimate
Socio-demographic	Age (years), M±SD	56.6±4.5
	45 – 49, n (%)	65(5.8)
	50 – 54	305 (27.3)
	55 – 59	430 (38.4)
	60 – 65	319 (28.5)
	Education levels, n (%)	
	primary not completed / without school education	14 (1.3)
	primary	198 (17.7)
	basic vocational	417 (36.8)
	secondary	455(40.7)
tertiary	40 (3.6)	
Health	BMI (kg/m <sup>2</sup> ), M±SD	29.6±5.4
	underweight, n (%)	2 (0.2)
	normal	221 (19.7)
	overweight	428 (38.2)
	obese	468 (41.8)
	WHR, M±SD	0.9±0.1
	< 0.85, n (%)	435 (38.9)
	≥ 0.85	684 (61.2)
	Age at last menstruation (years), M±SD	49.1±3.8
	Menopause, n (%)	
	early (up to 45 years)	177 (18.4)
	normal (46–55 years)	778 (80.8)
	late (56+ years)	8 (0.8)
	Parity, n (%)	
	yes	1078 (96.3)
no	36 (3.2)	
Number of births, M±SD	2.9±1.3	
1, n (%)	74 (6.9)	
2	413 (38.4)	
3	318 (29.6)	
4+	270 (25.1)	
Type of births, n (%)		
only vaginal	849 (83.5)	
only Caesarean	71 (7.0)	
both vaginal and Caesarean	97 (9.5)	

**Table 4.** Spinal pain characteristics in the examined women

Pain	Spine		
	neck	thoracic (chest)	lumbar (low back)
Prevalence, n (%)	642 (57.4)	282 (25.2)	914 (81.7)
Severity, M±SD	5.5±2.0	5.5±2.1	6.0±2.1
Age at onset (years), M±SD	45.2±8.3	45.6±8.1	43.6±8.2

**Table 5.** Isolated and coexisting pain in the spine of the examined women

Number of affected sections of spine	n	%	Section of spine	
			n	%
Pain isolated only in one section of spine	569	50.8	neck	142 12.7
			thoracic	34 3.0
			lumbar	393 35.1
Pain coexisting in two sections of spine	381	34.0	neck and thoracic	29 2.6
			neck and lumbar	302 27.0
			thoracic and lumbar	50 4.5
Pain coexisting in three sections of spine	169	15.1	neck, thoracic and lumbar	169 15.1
Total	1119	100.0	Total	1119 100.0

**Impairment of daily life activities due to spinal pain in the study group.** Back pain usually disturbed the studied women's standing – complete disorder of this function was reported by almost one in three (Fig. 1). Considering the complete and very severe disorders, back pain disturbed the studied women most frequently at weightlifting (almost 20%), travel and driving (about one in ten of the examined women). Considering the complete, very severe and severe disorders, back pain disturbed the studied women most frequently while sitting (over 40%), resting (40%) and reading (one in three of the women in the study). Most rarely, back pain disturbed the examined women in sleeping – none of them reported complete, very severe and severe disorder of this function, approximately ¼ indicated a minimal disorder and 27% – the lack of disorder of this function because of back pain.

The average values were calculated of the responses to the questions about the impact of back pain on the 15 activities of daily life (Fig. 2). The highest average (2.6) was obtained for pain growth and rest, i.e. back pain disturbed the studied women's daily functioning, and above all, their rest. Back pain disturbed the studied women a little less while standing (average 2.2) and lifting items (2.1). Smaller disturbances because of back pain in the examined women concerned such functions as: traveling and headaches, it disturbed driving only slightly, sitting and reading (average 1.8), even less – social life (1.6), independence (1.5), running the house and working (1.3). Back pain disturbed the tested women's sleep (0.7), concentration (0.9) and walking (0.9) to a very small extent.

Average NDI 34.7% ± 14.6%, ODI 34.4% ± 16.5% and TDI 34.0% ± 14.9% show moderate impairment of daily functioning because of back pain.

The rates of disability in back pain at appropriate intervals were also analyzed (Fig. 3).

The highest percentage (48.5%) of the surveyed women with back pain had a moderate degree of impaired daily functioning because of pain in the cervical spine, and (44.5%) a moderate degree of impaired daily functioning because of the pain in the lumbar spine.

Severe disruption of daily functioning was reported by 14% of women because of pain in the cervical spine, complete disruption in 0.9%, and mild in 32.6%; in 4% of the surveyed women, there were no disturbances in everyday functioning due to pain in the cervical spine. Severe disruption of daily functioning was reported by 30% of the women because of pain in the lumbar spine, 7% were crippled and 0.7% had complete dysfunction.

The majority of the examined women had mild impairment of daily functioning due to back pain (44.6%), followed by moderate (37.6%), severe – 7.4%, and complete – 0.8%, whereas in 9.6% of the tested women with back pain there was no disturbance in daily life functioning, based on the overall disability rate in spinal pain.

**Impairment of daily living activities due to spinal pain acc. to selected factors.** The impact of spinal pain on daily life activities increased with increasing BMI and rise in pain severity when the pain began at an earlier age, and when there was coexisting pain in another section of spine. On average, impairment was higher in the less educated women, compared to those better educated. No significant relationship was found between the effect of spinal

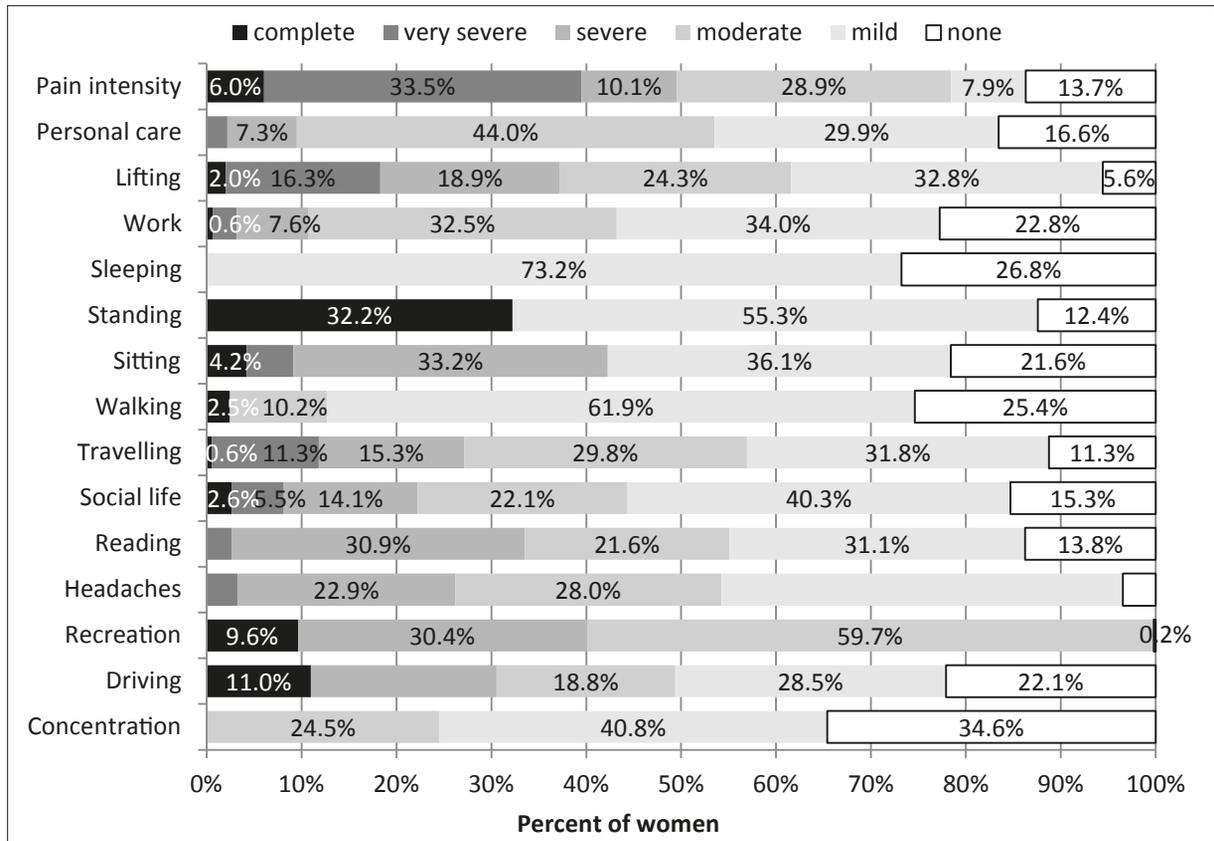


Figure 1. Impairment of daily life activities in the examined women

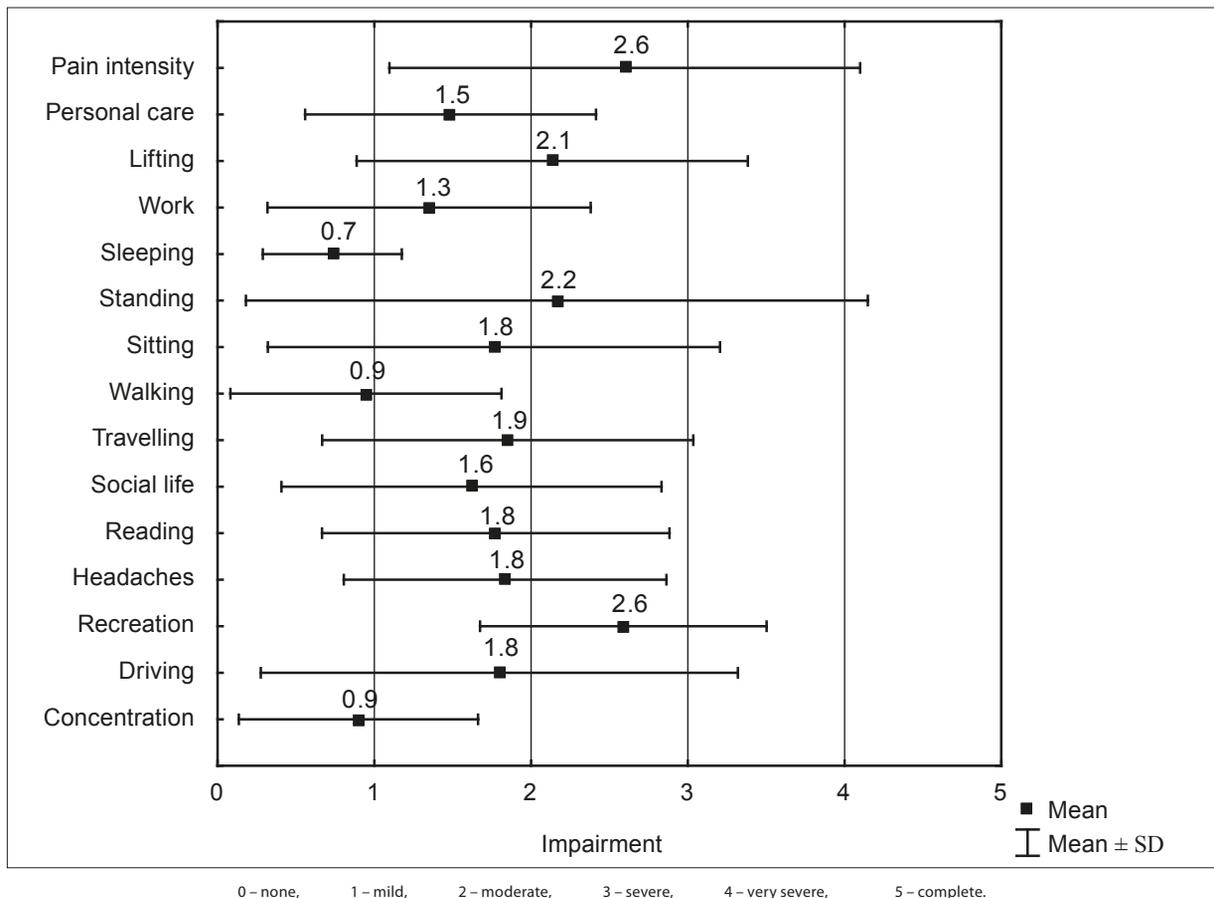


Figure 2. Mean impairment of daily living activities in the examined women

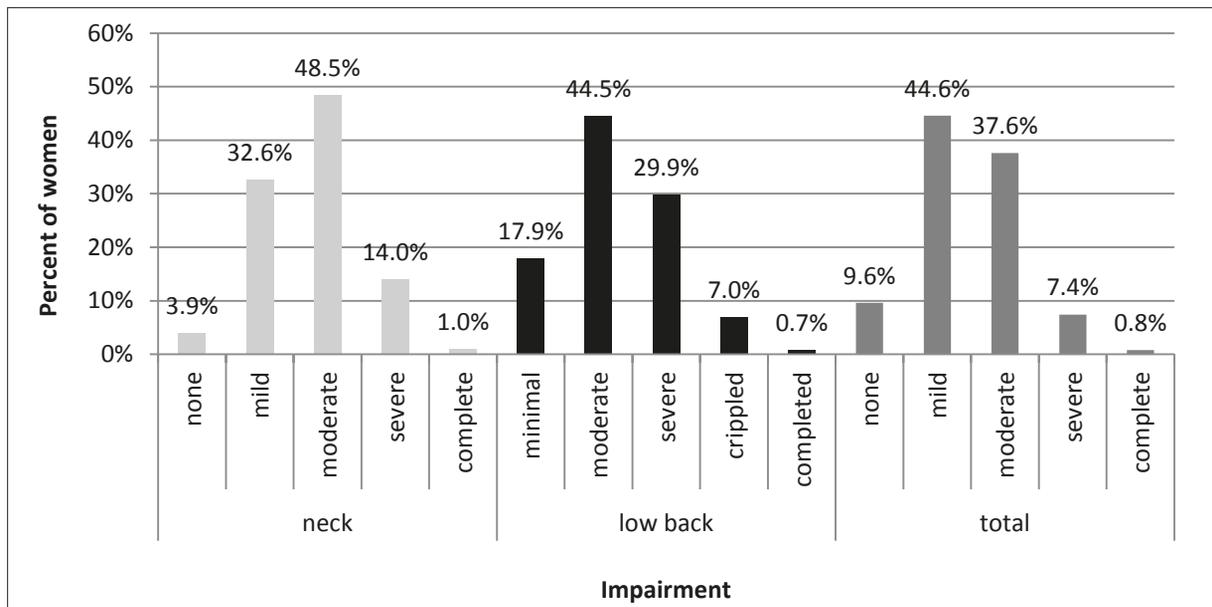


Figure 3. Aggregated impairment of daily living activities in the examined women

pain on daily life activities, and age between 45–65, WHR, age at last menstruation, parity, number and types of births (Tab. 6).

Table 6. Spine pain-induced impairment (%) acc. to selected factors in the examined women

Type of factor	Factor	Impairment (%) due to pain in spine					
		neck		low back		total	
		b	p	b	p	b	p
Socio-demographic	Age (years)	0.04	0.716	0.08	0.478	0.08	0.444
	Lower education vs. at least secondary	0.57	0.019	0.52	0.050	0.49	0.048
	BMI (kg/m <sup>2</sup> )	0.36	<0.001	0.51	<0.001	0.41	<0.001
	WHR	9.07	0.161	13.32	0.067	10.69	0.106
Health	Age at last menstruation (years)	-0.13	0.272	-0.04	0.800	-0.05	0.679
	Parity (yes vs. no)	1.29	0.607	1.14	0.683	1.12	0.658
	Number of births	0.08	0.801	0.27	0.477	0.13	0.697
	Type of births only caesarean vs. only vaginal	2.06	0.257	2.24	0.271	1.67	0.369
Spine	both vaginal and caesarean vs. only vaginal	2.73	0.081	1.91	0.285	1.90	0.241
	Severity of pain	2.78	<0.001	3.32	<0.001	3.05*	<0.001
	Pain age onset (years)	-0.26	0.002	-0.35	<0.001	-0.39*	<0.001
	Coexisting pain in another section / 2 other sections of spine (yes vs. no)	6.10	<0.001	7.18	<0.001	7.73	<0.001

b – slope term,  
\* – severity in total = max severity from pains in all sections of spine, pain age onset = min age from pains in all sections of spine.

## DISCUSSION

Work in agriculture often includes activities which are frequently repetitive or impose extreme positions on the body, all of which may cause pain in any segment of the spine. Previously, it was demonstrated that back pain is more prevalent in male farmers than in the general working population [5]. Significant physical load and strain is most often put on the lower body during agricultural work, hence the prevalence of low back pain in rural workers is high [6]. Repetitive stooping, a common activity in agriculture, is suggested to be a major risk factor for low back pain among rural workers [7]. Xiao et al. [8] observed common chronic musculoskeletal pain, which concerns the back, knee, and hip in a group of farm workers. The authors found that in women the pain increased with age, and was associated with common work positions and years of working in agriculture [8]. Spinal problems significantly impair daily activities and the quality of life in general. It is especially important when people also experience additional disorders.

The presented study analysed whether spine pain has an influence on daily activities in Polish postmenopausal women. The Neck Disability Index (NDI) and Oswestry Low Back Disability Index (ODI) Questionnaires were used to analyse the assessment of functional disorders of spinal pain. The NDI and ODI questionnaires have been applied since the 80s of the last century [9; 10]. For many investigators, these questionnaires are the most important tools for measuring the degree of disability in spinal pain.

The obtained results showed that the most common pain experienced by Polish postmenopausal women working in agriculture occurs in only one section of the spine (51%); 35% of them suffer from pain in the lumbar spine, almost 13% of the women complain about neck pain, and the fewest (3%) in the thoracic spine. 27% of the women suffer from pain coexisting in the neck and lumbar sections of the spine, and 15% from pain in all the three sections. In the analysed group of women, the impact of back pain on daily life activities was higher when the severity of pain was greater, the pain began at an earlier age, and when any other pain was already

present in a different section of the spine. Additionally, it was found that when women had a higher body weight and lower levels of education, the effect of pain on daily activities was greater.

The intensity of pain affects the level of disability. Several factors can influence the intensity of spinal pain. The study by Urquhart et al. [11] showed that high pain intensity was associated with younger age, alcohol intake, unemployment, and concurrent pain. A higher BMI was also previously reported to be related with a high intensity of low back pain [11, 12].

Some physical disabilities are often observed in relation to lower back pain [13]. Earlier, disturbances in sitting and walking were reported as the most frequent among Lithuanian patients with low back pain [14]. In the current study, spine pain disturbs resting, standing and lifting objects the most, and sleeping, concentration and walking the least. It also was also observed that there occurred a moderate degree of impaired daily functioning caused by neck and lumbar pain in the surveyed women (48.5% and 44.5%, respectively), while only in 4% of the women pain in the cervical spine caused no disturbances in everyday functioning.

Due to the averages of NDI (34.7%), ODI (34.4%) and TDI (34.0%) obtained in this study, it can be concluded that a moderate impairment of daily functioning occurs because of back pain in the analysed Polish women working in agriculture. Similarly, the study by Baumgart et al. [15], using the ODI and NDI questionnaires, performed on 60 randomly selected Polish nurses working in different wards, showed a moderate level of disability. Another study from Poland, also using the ODI index, recruited persons living in rural areas and demonstrated, that rehabilitation treatment of lower back pain produced worse results for those working physically, compared to intellectual workers [16]. Evaluation of the rehabilitation treatment of lower back pain measured by ODI showed a statistically significant difference in the improvement of the quality of life, reduction of pain and depression in patients from Zamość, Poland [17]. In the study of Altuğ et al. [18], the Oswestry and the Neck Disability Indexes were used to evaluate the disability level in patients with low back pain and neck pain. The authors observed that patients with low back pain were younger than those with neck pain. The emotional status and disability level scores were higher in patients with low back pain, while there were no differences in pain intensity or pain duration between both groups [18].

In order to minimize the impact of back pain on daily activities, it is necessary to educate women of all ages about the prevention of back pain. Unfortunately, patients with low back pain tend to avoid physical activities. Earlier studies showed that physical activity has a positive impact on the musculoskeletal system and also increases bone mineral density [19].

Knowledge about the disability areas caused by spinal pain plays an important role in the determination of nursing care. A study based on Australian adults demonstrated that being a woman suffering from higher levels of pain and severe disability, and the fear of the impact of pain on future work and life influenced the seeking of care [20]. The authors of the presented study believe that implementation of some prophylaxis programmes for rural workers, especially women, will be useful in the prevention of spinal pain and, in turn, disabilities.

## CONCLUSIONS

- 1) Postmenopausal women working in agriculture suffer most often from pain in the lumbar spine, less frequently in the neck, and least in the thorax. The most common is an isolated pain in only one section of the spine.
- 2) Spine pain disturbs most the women's rest, standing, lifting objects, and their sleep, concentration and walking the least.
- 3) In general, the impact of back pain on the activities of daily life is moderate, such a result was obtained for almost half of the examined women.
- 4) The impact of spine pain on the activities of daily life increases with the greater the severity of pain, the earlier (in terms of age) the pain started, the higher body weight, the lower the education level, and if there is a co-existing pain in any other spine section.
- 5) There is a need to educate women at all ages about the prevention of spinal pain in order to minimize the impact of symptoms on the activities of daily life.

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