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SPINAL PAIN SYNDROME INCIDENCE AMONG PARAMEDICS IN EMERGENCY RESPONSE TEAMS

Agnieszka Gonczaryk[1], Jaroslaw Piotr Chmielewski[2], Agnieszka Strzelecka[3], Jaroslaw Fiks[4], Tomasz Wojcik[3], Magdalena Florek-Luszczki[5]

[1]Department of Health and Social Policy, Marshal's Office in Warsaw, Poland
[2]College of Rehabilitation in Warsaw, Poland
[3] Collegium Medicum, Institute of Health Sciences, Jan Kochanowski University, Kielce, Poland
[4]Office of the Patient Ombudsman, Warsaw, Poland
[5]Institute of Rural Health in Lublin, Poland

ABSTRACT

INTRODUCTION: Spinal pain syndrome is a condition people of different ages suffer from. Its incidence is determined by many factors: age, gender, genetic disposition, lifestyle, the type and characteristics of one's occupation, years of work experience. Paramedics are particularly vulnerable to musculoskeletal ailments, due to the professional activities carried out at work: lifting, moving, and carrying patients or medical equipment, crossing architectural barriers, forced posture during work, standing, walking, and sitting for long periods. The study aimed to indicate the effect of professional work on the incidence of spinal pain syndrome in paramedics working in mobile Emergency Response Teams.

MATERIAL AND METHODS: The research took place between May and September 2019, using diagnostic survey methodology on 238 (223 male, 15 female) paramedics in mobile Emergency Response Teams (ERT) operating in the Masovian voivodship. The mean age was 39.03 ± 9.27 years for males, 31.93 ± 7.76 years for females. The research tool was a self-developed questionnaire.

RESULTS: All participants (100%) suffered from spinal pain syndrome. A majority of the participants (98; 41.18%) reported pain being located in the lumbar area and being related to lifting, moving and carrying patients in teams (149; 62.60%).

CONCLUSIONS: Spinal pain syndrome is a widespread phenomenon among ERT paramedics. The incidence and nature of lumbar area pain are strictly related to the type of work paramedics do. Applying rules of work ergonomics and using aid affects incidence and decreases the frequency of SPS.

KEY WORDS: paramedic; spinal pain syndrome; work environment; occupational hazard; work safety

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INTRODUCTION

Diseases and ailments related to the musculoskeletal system, in particular the spinal column, are widespread to the point of becoming one of the primary problems of the social, medical, and economic nature, consequently classifying them as lifestyle diseases. The development of musculoskeletal illness is further affected by a sedentary lifestyle, being

ADDRESS FOR CORRESPONDENCE:
Jaroslaw Piotr Chmielewski, College of Rehabilitation in Warsaw, Warsaw, Poland
e-mail: j.chmielewski@ios.gov.pl
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overweight, genetic aspects, substance abuse, adopting an unphysiological posture while resting and an unergonomic posture at work. Musculoskeletal illnesses are the result of a longstanding influence of the work environment, factors related to activities beyond work, and individual qualities such as age, gender, body type, physical agility, and susceptibility to stress [1–3].

In clinical practice, it is often difficult to define the exact source of mechanical spinal pain in patients. Deyo and Weinstein [4] stated that as many as 85% of the patients cannot be offered a final diagnosis due to the weak relationship between symptoms, pathological changes, and imaging test results. The inability to give a precise diagnosis causes unspecific diagnostic terms, such as sprains, strains, spasms, and degenerative changes, to be used more commonly.

Spinal pain syndrome (SPS) is a heterogeneous group of disorders with varying etiology. The primary mechanism causing pain in the spinal area is regarded to be a mechanical factor causing functional disorders of the spine and the structures connected to it anatomically and functionally. This occurs when static and a dynamic strain crosses an adaptational threshold and exceeds the endurance of the spine and the surrounding tissues against applied forces. SPS is not a disorder in and of itself, but more so a co-existing symptom. Spinal disorders cause sudden pain in every area of the spine (cervical, thoracic and lumbosacral), although it is most commonly located in the lumbosacral area, as well as cause stiffness, mobility limitations, deformations, and various neurological syndromes. Comorbid symptoms of spinal pain syndrome are often: numbness, tingling, sensory disturbances, decrease in muscle strength, reflexively adopting an unnatural posture, intestinal and bladder symptoms, as well as irritation. A symptom suggesting the presence of SPS is most often acute pain, which can come in different degrees of intensity. It can be the case that the pain eases on its own when certain postures are adopted, or the body moves in a certain way [5–8].

SPS among paramedics, which may involve a temporary inability to work, disability, or occupational illnesses, should not be evaluated solely as the degree of individual dysfunction, but rather in the overall context of the employee healthcare system [1–3].

Similarly, to other medical occupational groups, paramedics suffer from the risk of musculoskeletal disorders, in particular SPS. Common threats in this occupational group include musculoskeletal system strain, leading to pain syndromes. Activities repeated a multitude of times involving moving, lifting, and carrying patients and medical equipment, bending down, and shift system work all foster the development of adverse health effects. They occur during situations where the mechanical action significantly exceeds physical endurance or functional capacity, and they can be the result of an injury that occurred during a one-time strain or a sum of microlesions that have been occurring over time [9].

Direct causes of SPS in this occupational group include static and dynamic straining of the spine, the magnitude of which should be analyzed in the context of behaviors not adhering to the rules of prophylaxis and ergonomics, as well as the lack of proper auxiliary equipment [3, 10].

SPS includes different kinds of pain which may overlay on top of each other, hindering their proper diagnosis. The etiology of SPS is multifaceted and the syndrome is hard to properly treat. Currently, they are disorders classified as diseases of affluence, which are diagnosed in persons of different ages. SPS is one of the most common ailments of the musculoskeletal system. It is estimated that on a worldwide scale, approximately 80% of the human population will suffer from this condition. Meanwhile, approximately 50% of those participating in the labor force are already reporting chronic spinal pain. Spinal disorders are the leading condition in the area of musculoskeletal system pathologies, contributing to the inability to work and the development of chronic spinal pain syndromes. These disorders are one of the most common causes of absence at work, significantly decreasing the quality of life, both professional and private. Unfortunately, social awareness regarding strain mechanisms is continuously too low, which is a significant issue for public health and occupational medicine. Therefore, SPS is currently regarded as a para-occupational disease, wherein work conditions are one of the considerable factors influencing the emergence of pain issues [1–3, 11–15].

A symptom suggesting an SPS diagnosis is most often acute pain, which comes in different degrees of intensity. It may happen that it is relieved automatically when certain body postures are adapted, or when certain movements are executed. Spinal pain may be caused by inherited anomalies, degenerative changes, inflammations, cancers, injuries, overloading, metabolic disorders, and psychological

problems. Meanwhile, the symptoms that are often comorbid to spinal pain syndrome include numbness, tingling, sensory disturbances, muscle weakening, reflexively adopting an unnatural body posture, sleep disturbances, and symptoms in the intestines and urinary bladder, as well as depression [1, 16–18].

Due to its scale of prevalence, SPS constitutes a serious health complication. It is estimated that over half of the Polish population has experienced pain in the spinal area at least once. Pain, discomfort, and poor well-being, the cause of which is the straining of structures within the musculoskeletal system during work, are issues affecting the representatives of the broadly understood category of medical personnel, therefore it is all the more significant to understand the scale of incidence for this phenomenon in different occupational groups, including paramedics [18–20].

It is characteristic of an ERT paramedic's work to spend a large amount of time in a standing position and moving in it, or in a sitting position. It is equally prevalent to be in a position where the torso is bent forward, which can additionally be accompanied by spinal rotation in the transverse plane and bending to the side in the frontal plane, which occurs mostly while carrying out medical procedures around the patient. Following the procedures of work ergonomics and respecting the rules of the spine's biomechanics may prevent ERT paramedics from overloading their spines. For this reason, it is extremely important for them to have a basic understanding of the most common disorders related to the spine and the rules of prophylaxis [2, 3].

MATERIAL AND METHODS

The study was conducted between May and September of 2019 among occupationally active paramedics working in ERTs from five operational regions of the Mazovian voivodship, located in Warsaw, Płock, Ostrołęka, Siedlce, and Radom.

The sample choice was deliberate given that on the national scale, the Mazovian voivodship has the highest number of mobile ERTs functioning.

The study was carried out in compliance with the rules outlined in the Helsinki Declaration [21], as it was anonymous and voluntary for participants. The participants granted informed consent regarding their participation, and their health condition was not an obstacle in independently filling out the self-developed questionnaire. The participants were informed about the aims of their study, as well as their ability to withdraw participation at any stage, and that participation was voluntary. The research method used in this study was the diagnostic survey method. The questionnaire technique was applied, using the self-developed questionnaire. The questionnaire consisted of 20 questions. The first four were dedicated to demographic data collection, such as gender, age, level of education, and years of work experience. The second part of the questionnaire consisted of 16 questions that asked participants about more in-depth data related to the experienced spinal pain, its location and prophylaxis, situations intensifying the pain, ways of coping with the pain, and knowledge regarding ergonomics and work safety and hygiene. Qualitative variables included the distribution (n) and frequency (%). Confirmatory factor analysis (CFA) was carried out on dichotomous variables expressing the type of activity that intensifies pain for participants. The statistical analysis was carried out using the STATISTICA ver. 13.1 PL statistical software. The significance level was set at $\alpha = 0.05$.

RESULTS

The final analysis included 238 participants, 223 of which were male and 15 female. A definite majority of the participants were male (93.69%). The mean age of the participants was 39.03 ± 9.27 years for men, and 31.93 ± 7.76 years for women. The mean work experience of the participating paramedics showed significant gender differences ($p = 0.0001$). It was 12.62 ± 9.41 years for males, and 5.36 ± 7.04 years for females. In both groups, the shortest work experience was approximately half a year. Detailed data are shown in Table 1.

Among the participants, 58.82% declared to have higher education, 25% had secondary or further secondary education, and an equal percentage had a master's degree. Participants had further secondary education, or professional/master's degree in higher education (Tab. 2).

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Detailed results regarding the frequency of spinal pain, its location and nature, methods of coping

with the experienced pain, the posture adopted at work, as well as the frequency of performing activities relating to the patient during shifts and following the rules of ergonomics during the work process were presented in Table 4.

The analysis of the data related to the spinal pain experiences found all participants indicated that they experience pain during work at different time intervals. The frequency of pain incidence among the participating paramedics is varied. Most often this symptom occurs once a week (77; 32.35%). A small percentage of the participants experience this state a couple of times a year (18; 7.57%).

The most commonly indicated location of spinal pain as reported by participants was the lumbar area (98; 41.18%). A small percentage of the participants reported the entire spine (23; 9.66%) being the location of the experienced pain and the related dysfunction while carrying out professional work.

Table 1. Participant age in years and years of participant work experience between genders

Participant age in years between genders						
Gender	N	M	SD	Min	Max	p-value
Male	223	39.03	9.27	23.00	65.00	0.003*
Female	15	31.93	7.76	23.00	50.00	
*Mann-Whitney U Test, $p < 0.05$						
Years of participant work experience between genders						
Gender	N	M	SD	Min	Max	p-value
Male	223	12.62	9.41	0.50	41.00	0.0001*
Female	15	5.36	7.04	0.50	28.00	
*Mann-Whitney U Test, $p < 0.05$						

The nature of the indicated pain experiences could, in the opinion of the participating paramedics, be described as radiating (74; 31.09%), chronic (59; 24.79%), shooting (45; 18.91%), and acute (35; 14.71%).

What is worrying is the fact that every third of participating paramedics reported consuming painkillers as a way of coping with the experienced pain (92; 38.66%). A small percentage of the participants indicated that they make use of the treatment offered in sanatoriums (11; 4.62%).

Bent posture during professional work most commonly (152; 63.86%) determined the intensity of the experienced spinal pain of the participating paramedics. A small percentage pointed towards work while kneeling (21; 8.83%) or sitting (18; 7.56%).

Participants reported that during the on-call time, due to the specifics of their occupation as paramedics, they move, lift, or carry patients between six and ten times (116; 48.74%), followed by 11–15 times (72; 30.25%) or up to 5 times (43; 18.07%). However, it has to be stressed that these were estimated reports, and the actual number of such activities is determined by the given day, season, communication incidents, or epidemiological situation.

A significant factor in the work of a paramedic is adhering to the rules of ergonomics. However, the type of work they do, stress, or the patient's behavior forces paramedics to act quickly. Almost 70% of the participants mostly (127; 53.36%) or fully (41;17.25%) adhered to the rules of ergonomics during the on-call time. Every fifth participant mostly did not (57; 23.94%), and a small percentage did not follow them at all (13; 5.46%).

Table 2. Level of education between genders

Level of Education	n (%)	Secondary/Further Secondary Education	Professional Higher Education	Masters Higher Education	p-value
Male	223 (100.00)	48 (21.52)	132 (59.19)	43 (19.28)	0.109*
Female	15 (100.00)	1 (6.67)	8 (53.33)	6 (40.00)	

* χ^2 Test, $p > \alpha$; $\alpha = 0.05$

Table 3. Level of education between genders

Level of Education	N (%)	Secondary/Further Secondary Education	Professional Higher Education	Masters Higher Education	p-value
Male	223 (100.00)	48 (21.52)	132 (59.19)	43 (19.28)	0.109*
Female	15 (100.00)	1 (6.67)	8 (53.33)	6 (40.00)	

* χ^2 Test, $p > \alpha$; $\alpha = 0.05$

Table 4. Frequency of spinal pain incidence among participants

Overall	n	%
	238	100.00
Frequency of back pain incidence		
Every day	53	22.27
Once a week	77	32.35
A few times per month	37	15.55
A few times per quarter	29	12.18
A few times per semester	24	10.08
A few times a year	18	7.57
Location of the pain		
Cervical area	27	11.34
Thoracic area	52	21.85
Lumbar area	98	41.18
Sacral area	38	15.97
Entire spine	23	9.66
Nature of the pain		
Acute	35	14.71
Chronic	59	24.79
Radiating	74	31.09
Shooting	45	18.91
Feeling of burning	17	7.14
Other	8	3.36
Coping with the experienced pain		
I take painkillers	92	38.66
I use rehabilitation procedures	42	17.65
I do physical activity (exercises)	54	22.69
I take a sick leave	39	16.38
I use sanatorium treatment	11	4.62
Posture at work		
Work in a standing position	24	10.08
Work in a bent position	152	63.87
Work in a squatting position	23	9.66
Work kneeling	21	8.83
Work in a sedentary position	18	7.56
Frequency of moving, lifting, and carrying patients		
1–5 times	43	18.07
6–10 times	116	48.74
11–15 times	72	30.25
More than 15 times	7	2.94
Following ergonomics rules during on-call time		
Always	41	17.23
Mostly yes	127	53.36
Mostly no	57	23.95
Never	13	5.46

The years of work experience after which spinal pain occurred in specific participant age groups were presented in Table 5. In order to do so, participants were divided into 4 groups: 20–30 years old, 31–40 years old, 41–50 years old, and 51 or more years old.

A majority of the participants aged 20–30 years indicated that they experienced spinal pain in the first five years of work experience or less, *i.e.*, 78.26%, while the smallest number stated that spinal pain had never occurred — 4.37%. Meanwhile, participants aged 51 years or above indicated that the pain would occur in the first five years of their work experience — 42.85%.

Meanwhile, the work experience of participants after which spinal pain occurred between the period of employment groups was presented in Table 6. In order to do so, participants were divided into 3 groups relative to the period of time they have been working: 1–10 years, 11–25 years, and 26 years or above.

In all periods of employment, spinal pain most commonly occurred in the first five years of the work experience with 63.88% of participants employed from 1 to 10 years, 63.71% — 11–25 years, and 53.93% — 26 years or above.

The work experience of participants after which spinal pain occurred between participant level of education groups was presented in Table 7. Participants were graduates of medical secondary schools, medical studies, as well as undergraduate and master's university courses.

A majority of participants with professional higher education indicated that they started experiencing spinal pain in the first five years of their work experience — 52.14%. Spinal pain occurred most often also in the first five years of the work experience of participants with secondary/further secondary education — 42.85%. Meanwhile, among participants with a master's higher education degree, a majority indicated that they started experiencing spinal pain between the sixth and tenth year of their employment — 46.93%.

Configural frequency analysis (CFA) was used to determine the activities carried out during on-call time, as illustrated in Figure 1. The result table (Tab. 8) presents the observed values, which are the factually observed frequencies of a certain combination of variables occurring; it also presents expected values, which are the average expected values of certain combinations of variables occurring, in this case,

Table 5. Period of work experience after which spinal pain occurred in participant age groups

Age	20–30 years		31–40 years		41–50 years		51 or more years	
Work experience	n	%	n	%	n	%	n	%
< 5 years	18	78.26	43	31.38	26	40.62	6	42.85
6–10 years	4	17.39	37	27.00	19	29.68	5	35.71
11–20 years	0	0	34	24.81	12	18.75	3	21.42
21–30 years	0	0	23	16.78	7	10.93	0	0
> 31 years	0	0	0	0	0	0	0	0
Did not occur	1	4.37	0	0	0	0	0	0
Overall	23	100.00	137	100.00	64	100.00	14	100.00

Table 6. Period of work experience after which spinal pain occurred relative to period of employment

Work experience < 5 years	Period of employment					
	1–10 years		11–25 years		26 years or above	
	n	%	n	%	n	%
6–10 years	23	63.88	72	63.71	48	53.93
11–20 years	13	36.11	41	36.28	27	30.33
21–30 years	0	0	0	0	14	15.73
> 31 years	0	0	0	0	0	0
Did not occur	1		0	0	0	0
Overall	36	100.00	113	100.00	89	100.00

Table 7. Period of work experience after which spinal pain occurred in participant education level groups

Level of Education	Secondary/Further Secondary Education		Professional Higher Education		Masters Higher Education	
Work experience	n	%	n	%	n	%
< 5 years	21	42.85	73	52.14	18	36.73
6–10 years	16	32.65	37	26.42	23	46.93
11–20 years	7	14.28	26	18.57	8	16.32
21–30 years	5	10.20	4	2.85	0	0
> 31 years	0	0	0	0	0	0
Did not occur	49	100.00	140	100.00	49	100.00

the type of activity carried out during the on-call time. The z-score value is the standardized normal distribution, and p is the p-value for the z-score. The type/antitype indicates whether a given combination of variables is actually higher/lower than the expected value. It was observed that the participating paramedics most commonly move, lift and carry patients in a team (149; 62.60%, $p = 0.000$; $p < \alpha$), followed by moving, lifting, and carrying patients with the use of additional equipment (57; 23.94%, p = 000; $p < \alpha$), moving, lifting and carrying medical equipment (29; 12.18%, $p = 0.000$; $p < \alpha$) while a small percentage pointed towards crossing architectural barriers and walking distances (3; 1.26%, $p = 0.000$; $p < \alpha$). The aforementioned activities were conditioned by the nature of the participants' work and carrying them out determined the intensification of the spinal pain.

DISCUSSION

As part of their professional activities, ERT paramedics often carry, move, or lift patients and medical

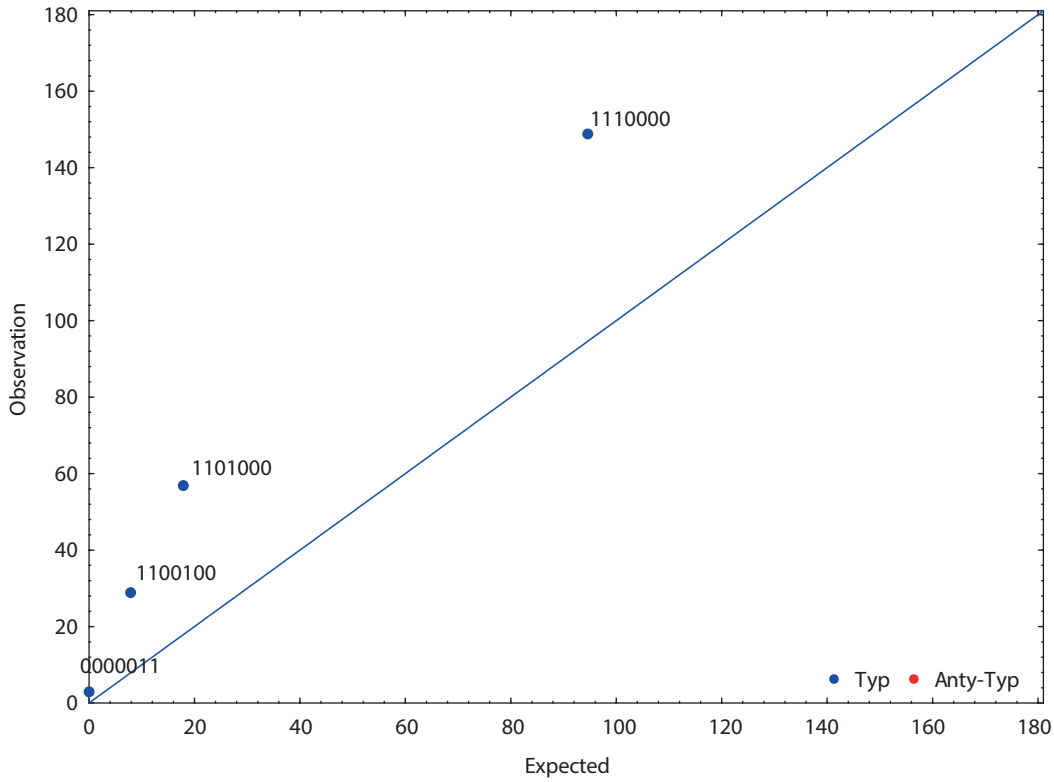

FIGURE. 1. Professional activities of participants which intensify spinal pain ailments: CFA analysis results

Table 8. Activities carried out at work by participants that intensify spinal pain syndrome

Codes	A	B	C	D	E	F	G	Observed	Expected	z-score	p-value	Type/antitype
0000011	0	0	0	0	0	1	1	3.0000	0.0000	2449.0743	0.0000	T
1100100	1	1	0	0	1	0	0	29.0000	7.8393	7.5577	0.0000	T
1101000	1	1	0	1	0	0	0	57.0000	17.7918	9.2954	0.0000	T
1110000	1	1	1	0	0	0	0	149.0000	94.5847	5.5951	0.0000	T

Key: [A] moving, [B] lifting, [C] carrying patients in a team, [D] lifting patients with the help of auxiliary equipment, [E] carrying medical equipment, [F] crossing architectural barriers, [G] walking distances. Codes — dichotomous variable: 0 signifies the lack and 1 the indication of a certain type of professional activity carried out by participants that intensifies the experienced spinal pain

equipment, cross architectural barriers, and work in a shift system. Due to the nature of their work, as well as the conditions it is carried out in, they are very overloaded mentally. The work carried out by ERT paramedics may foster various kinds of musculoskeletal ailments. These include activities carried out standing upright or sitting down. ERT paramedics are predisposed to experiencing SPS due to a wide range of factors and threats related to work overload.

Decreased physical activity, improper habits, and body posture during the day all cause changes to occur in the skeletal and ligament systems of the spine. Occupational straining and bad work ergonomics are factors that are very often the cause of chronic spinal pain [1–3].

The literature shows that SPS is a concern for countries with high and low socioeconomic status alike. SPS is the cause of the temporary or permanent inability to work, as well as a reason for entitlement to a disability pension due to the inability to work [3, 22].

In the present research, 100% of the participants reported experiencing pain in the spinal area. The obtained results are congruent with the results presented by other authors, while the percentage of paramedics complaining about such pain experiences amounted to 60–100% [9, 20, 23].

It was observed in the present study that SPS differs between participants, relative to sociodemographic variables like age, level of education, and

years of work experience. These results corresponded with the research carried out by Mekonnen, wherein the mean years of work experience after which spinal pain started occurring was much larger among workers employed for less than five years [24]. A similar relationship could be observed in the study carried out by Juraszek et al. [7]. They concluded that the mean time after which participants started noticing spinal pain was equal to 8.04 years.

The present research found that the most commonly reported location of spinal pain indicated by the participants was the lumbar area (41.18%), thoracic area (21.85%), sacral area (15.97%), cervical area (11.34%), and entire spine (9.66%). In the research by Kowalczyk et al. [9], it was shown that 64% of paramedics experienced pain located primarily in the lumbosacral area, followed by the cervical area (11.34%) and the thoracic area (16%). Meanwhile, in the research conducted by Grabska et al. [23], the participating paramedics reported pain located in the lumbosacral area (83.14%) followed by the thoracic area (12.35%), the cervical area (3.37%), and the entire spine (1.12%).

The frequency of pain experience incidence among participants is varied. In the present study, this symptom was most commonly present once a week (32.35%), every day (22.27%), a few times a month (5.55%), and a few times a year (7.57%). In Grabska et al.'s research [23], the frequency of pain incidence among paramedics reported was: often (34.83%), not very often (56.17%), rarely (5.61%), or not at all (3.37%). Meanwhile, in the research conducted by Kowalczyk et al. [9], most participating paramedics declared that the pain would occur: a few times a month at most (62%), a few times a week (13%), no more than once a week (17%), or every day (8%). In their study, Ciura and Klimek-Piskorz [20] found SPS present in paramedics at the following rates: lack of symptoms in 6.69% of the participants, periodic symptoms in 36.70% of the participants, frequent symptoms in 12.65% of the participants, constant symptoms in 5.06% of the participants.

According to the participants of the present study, bent posture (63.86%), standing position (10.08%), squatting (9.66%), kneeling (8.83%), sitting (7.56%) all determine the intensity of the spinal pain experience. In Kowalczyk et al.'s research [9], the indicated determinants were as follows: maintaining a forced posture (23%), bending the torso forward (16%), standing for long periods (9%), and sitting (6%).

As the present study has found, participants indicated several forms of coping with the experienced pain, which was as follows: consumption of painkillers (38.66%), physical activity (22.69%), rehabilitation procedures (17.65%), taking a sick leave (16.38%), sanatorium treatment (4.62%). Meanwhile, Ciura and Klimek-Piskorz [20] showed a varied consumption of painkiller drugs among participants, which included: not consuming painkillers at all (44.30%), consuming when the situation calls for it (77.84%), consuming constantly in small doses (3.16%), consuming constantly in large doses (1.26%).

The widespread incidence of SPS among paramedics may be an effect of low awareness regarding the rules of ergonomics that should be applied in the workplace [25].

Nearly 70% of the participants answered that they mostly (53.36%) or always (17.25%) comply with the rules of ergonomics during their shifts, while 23.94% mostly do not, and 13; 5.46% do not at all. In their research, Kulczycka et al. [26] found that 68% of paramedics confirmed attending courses regarding ergonomics, while 27% followed the rules of ergonomics. Among 75 paramedics from Iran, only half of them (51%) had an average awareness of the exact rules of ergonomics, and only 16% of them made use of them in practice [27].

In their study, Jones and Lee [28] showed that approximately 60% of the participating paramedics reported constantly experiencing SPS during resuscitation, with 36% only experiencing it occasionally, and only 4.4% did not experience spinal discomfort during resuscitation. Almost 24% of the participants reported having suffered a spine injury, 62% of which were of the opinion that the cause of back injury was related to carrying out the resuscitation procedure.

The presented results of research by other authors are in line with those obtained in the course of the present study. The differences may be a consequence of the participant sample size, the age of participants, as well as the fact, that the present study distinguished between the lumbar and sacral spine areas.

Strengths and limitations of the study

The main limitation of the study was the costs related to carrying out the research. It was for this reason that the study only used a self-developed questionnaire only. Another limitation was the sam-

ple size which was limited to participants living in the Mazovian voivodeship. For this reason, the results obtained in this study cannot be generalized to fit other parts of the country. The aforementioned limitations point towards a pilot evaluation. The research results presented in the article are a starting point for undertaking further actions aiming at formulating guidelines regarding the rules of work ergonomics in the ERT paramedic environment. The obtained results were comparable to those presented in meta-analyses and systematic overviews published by other authors. The use of various standardized tools, as well as broadening the participant sample to include other voivodships is recommended for future research.

CONCLUSIONS

The results obtained in the research give grounds to the statement that ERT paramedics can be classified as a group of high risk of SPS incidents.

In order to ameliorate the work conditions of paramedics and decrease the risk of musculoskeletal system injury, ambulances should be equipped with aid that facilitates the lifting and transport of patients.

Regular courses on ergonomics should be introduced with the aim to raise awareness on this subject among paramedics.

Undertaking physical activity by paramedics is a recommended prophylaxis against pain syndromes of the musculoskeletal system, especially the spinal area.

Conflict of interest

The authors declare no potential conflict of interest concerning the authorship and/or publication of this article.

REFERENCES

1. Akkarakittichoke N, Waongenngarm P, Janwantanakul P. The effects of active break and postural shift interventions on recovery from and recurrence of neck and low back pain in office workers: A 3-arm cluster-randomized controlled trial. Musculoskelet Sci Pract. 2021; 56: 102451, doi: 10.1016/j.msksp.2021.102451, indexed in Pubmed: 34450361.
2. Mroczek B, Łubkowska W, Jarno W, et al. Occurrence and impact of back pain on the quality of life of healthcare workers. Ann Agric Environ Med. 2020; 27(1): 36–42, doi: 10.26444/aaem/115180, indexed in Pubmed: 32208577.
3. Chmielewski J, Dziechciaż M, Czarny-Działak M, et al. Environmental health threats in the work process [in Polish]. Environ Med. 2017; 20(2): 52–61, doi: 10.19243/2017207.
4. Deyo RA, Weinstein JN. Low back pain. N Engl J Med. 2001; 344(5): 363–370, doi: 10.1056/NEJM200102013440508, indexed in Pubmed: 11172169.
5. Cohen SP, Rowlingson J, Abdi S. Low back pain. In: Warfield CA, Bajwa ZH. ed. Principles and Practice of Pain Medicine. McGraw-Hill, New York 2004: 273–282.
6. Milanow I. Back pain. Pediatr Med Rodz. 2014; 10(3): 253–264, doi: 10.5557/PiMR.2014.002.0028.
7. Juraszek K, Hagner-Derengowska M, Hoffmann M, et al. The impact of work on the occurrence of back pains on the example of nurses in the Kujawsko-Pomorskie voievodeship [in Polish]. J Edu Health Sport 2016; 6(8): 504–521, doi: dx.doi.org/10.5281/zenodo.60944.
8. Szpala M, Skorupińska A, Kostorz K. Occurrence of back pain – causes and treatment [in Polish]. Pomeranian J Life Sci. 2017; 63(3): 41–47, doi: 10.21164/pomjlifesci.286.
9. Kowalczyk M, Zgorzalewicz-Stachowiak M, Duchniak M, et al. Estimation of work-related back pain syndrome in emergency medical services personnel. Med Og Nauk Zdr. 2020; 26(1): 66–71, doi: 10.26444/monz/114455.
10. Jones AYM, Lee RYW. Cardiopulmonary resuscitation and back injury in ambulance officers. Int Arch Occup Environ Health. 2005; 78(4): 332––336, doi: 10.1007/s00420-004-0577-3, indexed in Pubmed: 15827758.
11. Knezevic N, Candido K, Vlaeyen J, et al. Low back pain. Lancet. 2021; 398(10294): 78–92, doi: 10.1016/s0140-6736(21)00733-9, indexed in Pubmed: 3411597.
12. Urits I, Burshtein A, Sharma M, et al. Low back pain, a comprehensive review: pathophysiology, diagnosis, and treatment. Curr Pain Headache Rep. 2019; 23(3): 23, doi: 10.1007/s11916-019-0757-1, indexed in Pubmed: 30854609.
13. Schwill C. [Back pain in the primary care setting: Specific back pain]. Internist (Berl). 2021; 62(1): 34–46, doi: 10.1007/s00108-020-00919-5, indexed in Pubmed: 33355682.
14. Ali M, Ahsan GU, Hossain A, et al. Prevalence and associated occupational factors of low back pain among the bank employees in Dhaka City. J Occup Health. 2020; 62(1): e12131, doi: 10.1002/1348-9585.12131, indexed in Pubmed: 32715531.
15. Hossain MD, Aftab A, Al Imam MH, et al. Prevalence of work related musculoskeletal disorders (WMSDs) and ergonomic risk assessment among readymade garment workers of Bangladesh: A cross sectional study. PLoS One. 2018; 13(7): e0200122, doi: 10.1371/journal.pone.0200122, indexed in Pubmed: 29979734.
16. Welk B, Baverstock R. Is there a link between back pain and urinary symptoms? Neurourol Urodyn. 2020; 39(2): 523–532, doi: 10.1002/nau.24269, indexed in Pubmed: 31899561.
17. Amiri S, Behnezhad S, Azad E. Back pain and depressive symptoms: a systematic review and meta-analysis. Int J Psychiatry Med. 2020 [Epub

ahead of print]: 91217420913001, doi: 10.1177/0091217420913001, indexed in Pubmed: 32220220.

18. Hartvigsen J, Hancock MJ, Kongsted A, et al. Lancet Low Back Pain Series Working Group. What low back pain is and why we need to pay attention. Lancet. 2018; 391(10137): 2356–2367, doi: 10.1016/S0140-6736(18)30480-X, indexed in Pubmed: 29573870.
19. European Agency for Safety and Health at Work. Musculoskeletal disorders in the healthcare sector. https://osha.europa.eu/en/publications/musculoskeletal-disorders-healthcare-sector/view (25.04.2022).
20. Ciura B, Klimek-Piskorz E. Lumbar spine pains experienced by paramedics [in Polish]. Aktywność Fizyczna i Zdrowie. 2021; 16: 19–24.
21. World Medical Association. World Medical Association Declaration of Helsinki. Ethical Principles for Medical Research Involving Human Subjects. JAMA. 2013; 310(20): 2191–2194, doi: 10.1001/jama.2013.281053.
22. Stewart Williams J, Ng N, Peltzer K, et al. Risk factors and disability associated with low back pain in older adults in low- and middle-income countries. Results from the WHO study on global ageing and adult health (SAGE). PLoS One. 2015; 10(6): e0127880, doi: 10.1371/journal.pone.0127880, indexed in Pubmed: 26042785.
23. Grabska E, Brzęk A, Knapik A, et al. The occurrence of back pain in young paramedics. Ann Acad Med Siles. 2016; 70: 291–297, doi: 10.18794/aams/67646.
24. Mekonnen TH. Work-related factors associated with low back pain among nurse professionals in east and west wollega zones, western ethiopia, 2017: a cross-sectional study. Pain Ther. 2019; 8(2): 239–247, doi: 10.1007/s40122-019-0129-x, indexed in Pubmed: 31254256.
25. Arial M, Benoît D, Wild P. Exploring implicit preventive strategies in prehospital emergency workers: a novel approach for preventing back problems. Appl Ergon. 2014; 45(4): 1003–1009, doi: 10.1016/j.apergo.2013.12.005, indexed in Pubmed: 24439126.
26. Kulczycka K, Grzegorczyk-Puzio E, Stychno E, et al. Wpływ pracy na samopoczucie ratowników medycznych. Med Og Nauk Zdr. 2016; 22(1): 66–71, doi: 10.5604/20834543.1198726.
27. Rahimi A, Vazini H, Alhani F, et al. Relationship Between Low Back Pain With Quality of Life, Depression, Anxiety and Stress Among Emergency Medical Technicians. Trauma Mon. 2015; 20(2): e18686, doi: 10.5812/traumamon.18686, indexed in Pubmed: 26290857.
28. Jones AYM, Lee RYW. Cardiopulmonary resuscitation and back injury in ambulance officers. Int Arch Occup Environ Health. 2005; 78(4): 332–336, doi: 10.1007/s00420-004-0577-3, indexed in Pubmed: 15827758.