

Original article

Influence of work activities on lower back pain of healthcare workers

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Summary

Introduction. Low back pain is often a disabling problem for most healthcare workers. It negatively affects health and work efficiency. It can be caused by work activities. The aim of the study was to examine which work activities were influential factors in low back pain in healthcare workers.

Methods. A cross-sectional study was conducted among healthcare workers employed in five institutions of three levels of healthcare in the southern region of Montenegro (December 2021-July 2022). The inclusion criteria were met by 192 voluntarily included respondents from various health professions. The research instrument was an anonymous questionnaire of 15 questions.

Results. There is a significant difference in the work activity of 63 primary, 67 secondary and 62 tertiary level respondents, average age 41.6 ± 12.99 years. At work, primary-level respondents mostly stand (15.9%); secondary-level respondents mostly walk up stairs with a load, bend down, and stand and carry a load (16.4%, 7.5%, 14.9%); whereas tertiary-level respondents mostly sit, bend, and lift a heavy load (33.9%, 4.8%, 4.8%). There was a significant difference between the groups in pain intensity ($p=0.003$), pain with any body movement ($p=0.017$), and work activity interval ($p<0.001$), but not in absenteeism from work due to pain. Work activities are the most influential in pain for 23.9% of secondary level respondents.

Conclusion. Standing, walking and carrying loads are influential work activities for lower back pain in healthcare workers. The positive correlation between work activity intervals and pain indicates the need to examine other contributing factors, but also to implement preventive measures that would be adapted to specific work requirements.

Key words: healthcare workers, low back pain, work activities

Introduction

Low back pain (LBP) is a significant public health problem [1]. It is the most prominent condition in adult clinical practice with a negative impact on physical and mental health, and work effectiveness [2]. In recent decades, it has become a leading cause of disease burden and the most

common factor of disability in the workplace, resulting in significant absenteeism [3, 4].

The etiopathogenesis of non-specific low back pain is multifactorial, including lifestyle risk factors, but also depends on the type of work, risk factors associated with professional activity, and work-related stress [5]. Several occupational factors play a key role in the development of LBP, especially in work environments that require frequent lifting, prolonged postures, and repetitive movements [4, 6]. Work activities related to the physical aspects of the job, muscle endurance, joint mobility, and movement biomechanics can significantly influence the prevalence and progression of low back pain [7, 8].

The lifetime prevalence of LBP in the general population is high and is estimated at 60-70%, and in the healthcare sector it is higher than in the general population [9, 10]. Physical and emotional factors associated with the healthcare profession contribute to a high prevalence of low back pain in healthcare workers with an annual prevalence of 40-50% [2, 11]. Intense work activities, prolonged standing, sitting, frequent bending, stereotyped tasks, heavy lifting, physically demanding roles in working with patients and improper ergonomics of the work environment are all risk factors in the healthcare profession [12, 13].

The aim of the study was to examine which work activities were influential factors of low back pain in healthcare workers.

Methods

Study design and sample

A cross-sectional study was conducted among healthcare workers employed in healthcare institutions of three levels of healthcare in Boka Kotorska (Montenegro). The research lasted from December 2021 to July 2022. The research included healthcare workers from the follow-

ing five institutions: Public Health Institution Health Center Herceg Novi, Public Health Institution Health Center Kotor, General Hospital Kotor, Special Hospital for Orthopedics, Neurology and Neurosurgery "Vaso Čuković" Risan and Institute for Physical Medicine, Rehabilitation and Rheumatology "Dr. Simo Milošević" Igalo. The study included 192 voluntarily included respondents. The inclusion criteria were age from 19 to 65 years, permanent employment, provision of answers to all questions, and the presence of lower back pain.

Ethical principles

The study was conducted in accordance with all ethical principles. Approval was obtained from the Ministry of Health of Montenegro (No. 2-500/21-4983/2 dated 29.12. 2021). Approvals were also obtained from the ethics committees/management boards of all involved institutions, including: Institute of Physical Medicine, Rehabilitation and Rheumatology „Dr. Simo Milošević” Igalo (No. 01/1-3579 dated 13.12.2021), Special Hospital for Orthopedics, Neurosurgery and Neurology "Vaso Čuković" Risan (No. 02-3778 dated 15.12.2021), Public Health Institution Health Center Kotor (No. 01-2302/2 dated 20.12.2021), General Hospital Kotor (No. 02-273 dated 07.02.2022) and Public Health Institution Health Center Herceg Novi (No. 1310 dated 21.06.2022).

Research instruments

Data were collected using an anonymous questionnaire designed for this study containing 15 questions. Seven questions were related to sociodemographic data (sex, age, anthropometric data, education, marital status, length of service), and the remaining questions were related to pain intensity, lumbar spine mobility, physical effort at work,

inability to work, physical activity in leisure time and self-assessment of quality of life. The Numeric Rating Scale (NRS) was used to assess pain intensity. The NRS is a valid and reliable segmented scale of 11 points. The ends of the scale are oriented from 0 "no pain" to 10 "worst possible pain". Based on the values on the NRS scale, the results were classified as: mild pain (1-4), moderate pain (5-6) and severe pain (7-10) [14–16].

Statistical data processing

The data were classified into three groups (in accordance with the corresponding level of the surveyed institutions). They were analyzed using descriptive and comparative statistics. The results are presented as the number of cases, percentages, arithmetic mean with standard deviation, and range of values.

Nominal and ordinal variables were analyzed using the χ^2 test.

For continuous variables with an asymmetric distribution, the median and interquartile range were used (to express central tendency and dispersion), and the nonparametric Kruskal-Wallis test was used for their comparison.

A value of $p < 0.05$ was taken as the threshold of statistical significance.

Statistical analysis was performed using the statistical package IBM SPSS Statistics v23.0 (IBM Corp., Armonk, NY, USA).

Results

The sample comprised 63 (32.8%) primary, 67 (34.9%) secondary, and 62 (32.3%) tertiary health care workers, with a mean age of 41.6 ± 12.99 years. There were significantly more female respondents at the primary and secondary level of health care compared to the respondents at the tertiary level of health care, and on average the respondents at the

primary level were older than the respondents at the tertiary and secondary levels of health care.

The participants were physiotherapists, nurses, laboratory technicians, technicians of other health professions (x-ray, dental, pharmaceutical and sanitary technicians), as well as doctors of medicine, dentistry and pharmacy. There were significant differences in the level of education in the examined sample. Secondary vocational education is more represented in the secondary and primary level of health care compared to the tertiary level of health care, while higher and higher professional education with specialization were more represented at the tertiary level of health care.

The analysis of data on work activities showed a statistically significant difference ($\chi^2=39.060$; $p < 0.001$) in the dominant work activity between the groups. At the primary health care level, 20.6% of respondents mostly sit, 15.8% of respondents mostly stand, 4.8% of respondents mostly stand and carry loads, 1.6% of respondents walk a lot, climb stairs and lift loads, and no respondents lift heavy loads (Figure 1).

At the secondary level of health care, 14.9% of respondents mostly sit, 17.9% of respondents mostly stand, 14.9% of respondents stand and carry heavy loads, 16.4% of respondents walk a lot, climb stairs and lift loads, and 7.5% of respondents often bend over during work tasks (Figure 1).

Mainly at work, 33.9% of respondents at the tertiary level of health care sit, 8.1% of respondents stand, and 4.8% of respondents stand and carry a load. Also, 4.8% of respondents at this level walk long distances, climb stairs and lift heavy loads, and 4.8% of respondents perform heavy physical work (Figure 1).

Analysis of the duration of the dominant work activity showed a significant difference between the examined groups ($\chi^2=34.376$; $p < 0.001$). A total of 31.7% of primary health care respondents take a break after one to two

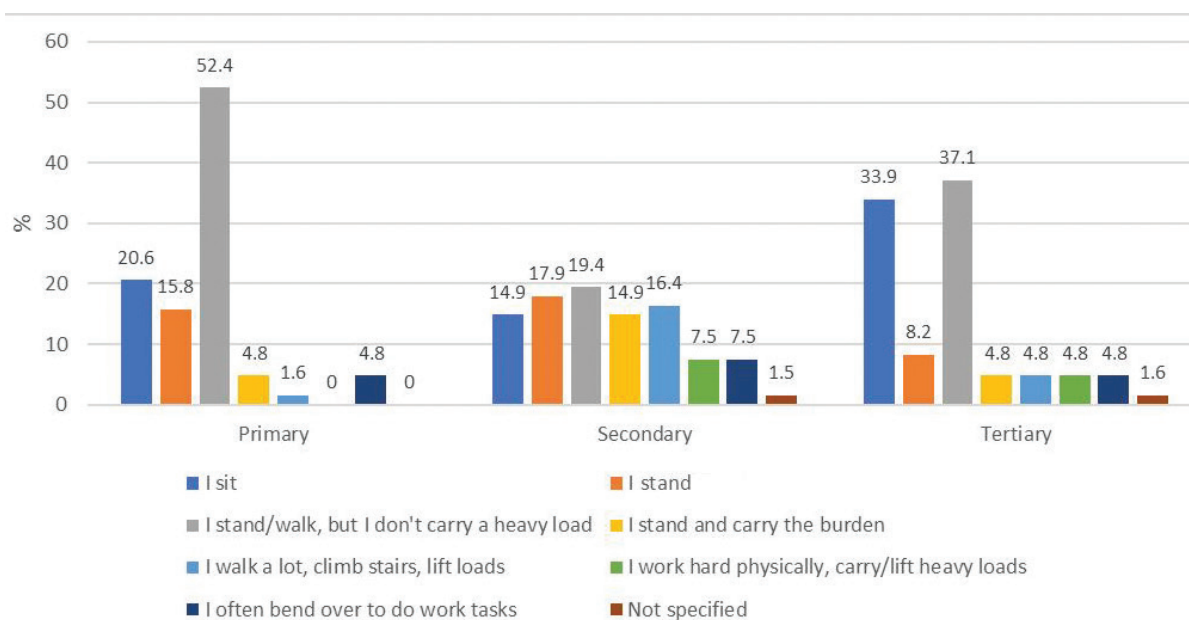


Figure 1. Distribution of work activity in three levels of health care

hours of work, while it is the case in 22.4% of secondary health care respondents and 25.8% of tertiary health care respondents. A total of 37.1% of respondents at the tertiary level of health care take a break after two to three hours of work, and 31.7% of respondents at the primary level of health care take a break after four hours of work. The largest share of

respondents at the tertiary level of health care (21%) takes a break after less than one working hour. A break after less than one working hour was reported by 17.5% of primary health care respondents and 10.4% of secondary health care respondents, while 25.4% of secondary health care respondents had a different answer (Figure 2).

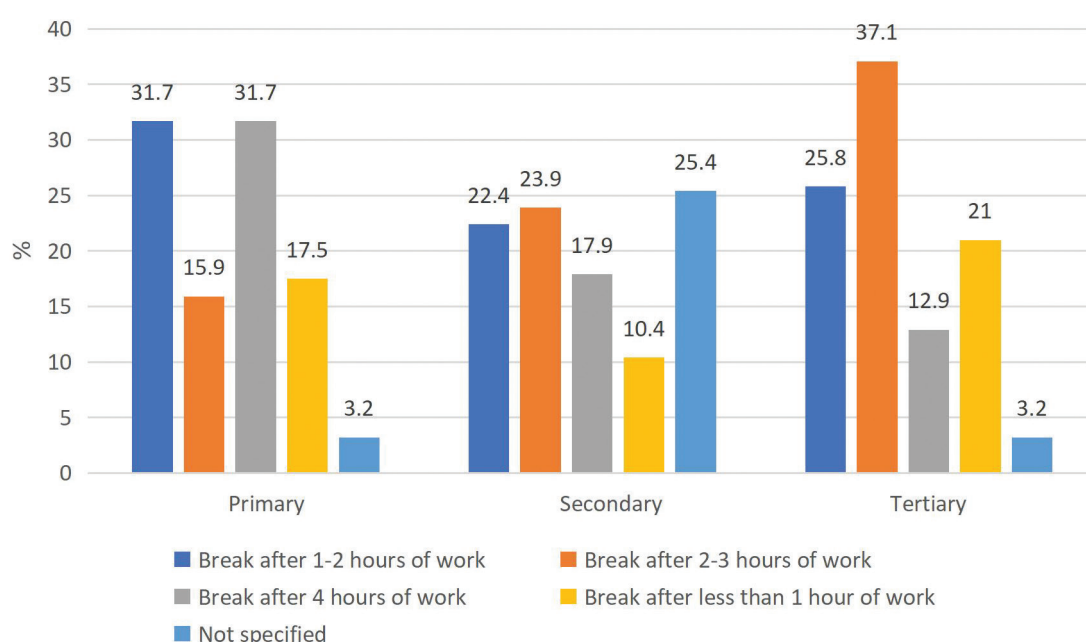


Figure 2. Distribution of breaks according to the duration of work activity

Among respondents at the primary, secondary and tertiary levels of health care, there was no significant difference in lower back pain during: sitting, standing, sleeping, work tasks, leisure activities, leaning forward, leaning back, lateral body tilt and trunk rotation, but there was a statistically significant difference in lower back pain between groups during any body movement ($\chi^2=8.120$; $p=0.017$) (Table 1).

Pain during any movement of the body was reported by 14.6% of respondents. Pain was most prevalent in the secondary level of respondents (23.9%) and was more common in the primary level of health care (12.7%) compared to the tertiary level of health care (6.5%) (Table 1). The average score of current pain intensity was 2.15 ± 2.35 (0.00-10.00). The

highest score was among respondents of the primary level of health care 2.68 ± 2.28 (0.00-9.00), and the respondents of the secondary level of health care had a higher score of current pain 2.37 ± 2.76 (0.00-10.00) compared to the respondents of the tertiary level of health care 1.37 ± 1.66 (0.00-9.00). Analysis of current pain intensity showed a significant difference in pain intensity between groups ($H=11.407$; $p=0.003$) (Table 2).

Due to lower back pain, 1.5% of secondary health care respondents were absent from work for more than 30 days. Due to pain, 7.9% of primary health care respondents, 3% of secondary health care respondents, and 1.6% of tertiary health care respondents were absent from work for 8-30 days. Because of lower back pain, 17.7% of tertiary health care

Table 1. Lower back pain related to work activity

	Level of health care – N (%)			
	Primary	Secondary	Tertiary	Total
Pain in the lower back when sitting $\chi^2=1.872$; $p=0.392$	31 (49.2)	33 (49.3)	24 (38.7)	88 (45.8)
Pain in the lower back when standing $\chi^2=1.090$; $p=0.580$	41 (65.1)	39 (58.2)	3 (56.5)	115 (59.9)
Pain in the lower back when sleeping $\chi^2=2.591$; $p=0.274$	20 (31.7)	25 (37.3)	15 (24.2)	60 (31.3)
Pain in the lower back during work tasks $\chi^2=5.525$; $p=0.063$	27 (42.9)	39 (58.2)	24 (38.7)	90 (46.9)
Pain when bending the body forward $\chi^2=2.290$; $p=0.224$	28 (44.4)	35 (52.2)	23 (37.1)	86 (44.8)
Pain when bending the body backwards $\chi^2=1.715$; $p=0.424$	19 (30.2)	14 (20.9)	18 (29.0)	51 (26.6)
Pain when moving the lateral tilt of the body $\chi^2=5.917$; $p=0.052$	21 (33.3)	11 (16.4)	12 (19.4)	44 (22.9)
Pain when rotating the trunk $\chi^2=2.400$; $p=0.301$	17 (27.0)	19 (28.4)	24 (38.7)	60 (31.3)
Pain with any movement of the body $\chi^2=8.120$; $p=0.017$	8 (12.7)	16 (23.9)	4 (6.5)	28 (14.6)
Pain not specified $\chi^2=0.036$; $p=0.982$	6 (9.5)	7 (10.4)	6 (9.7)	19 (9.9)
Pain in the lower back during leisure activities $\chi^2=0.772$; $p=0.680$	19 (30.2)	22 (32.8)	16 (25.8)	5 (29.7)

χ^2 - chi-square test; p -value; * p -value reaches statistical significance

Table 2. Pain intensity according to the NRS scale

	Level of health care	N	M	SD	Min	Max
Pain intensity H=11.407; p=0.003	Primary	63	2.68	2.28	0.00	9.00
	Secondary	67	2.37	2.76	0.00	10.00
	Tertiary	62	1.37	1.66	0.00	7.00
	Total	192	2.15	2.35	0.00	10.00

N - number; *M* - mean; *SD* - standard deviation; *Min*; *Max*

respondents, 11.9% of secondary health care respondents, and 4.8% of primary health care respondents were absent from work for 1-7 days, but these differences were not statistically significant ($\chi^2=11.413$; $p=0.179$).

Discussion

The workforce in the healthcare sector is an important element of a functional healthcare system, and the primary causes of lower back pain in healthcare workers are the workplace and work activities [17, 18]. This study examined the impact of work activity on lower back pain in healthcare workers at different levels of healthcare and identified standing, sitting, walking and physical work as the most significant. The impact of work activities among respondents of the primary level of health care were standing, walking and bending, of the secondary level of health care standing, walking up stairs with a load and strenuous physical work, and of the tertiary level of health care standing, long walking, carrying and lifting loads.

A cross-sectional descriptive study examining the risk factors of lower back pain in 245 healthcare workers showed that 32.2% of the respondents indicated a negative impact of pain on the efficiency of professional work. The most commonly recognized reported factors of LBP were prolonged standing (57.2%), bending (22.2%), lifting patients (20.6%), performing repetitive tasks (12.2%), and standing in awkward positions [17].

A retrospective cross-sectional study conducted among 604 healthcare workers aimed to identify biomechanical risk factors for low back pain. The results showed that in 40.4% of respondents, lower back pain was associated with work activities, and recognized factors included heavy physical effort, moving the patient, uncomfortable or prolonged working position, movements of trunk flexion and rotation, but also the reaction to a fall and unexpected movements of the patient [19]. A study by Gim highlighted repeated physical strain on the back musculature, patient uncooperativeness, unanticipated movements, and resistance during work as significant contributing factors to LBP in healthcare workers [20].

Our research showed a statistically significant difference between the groups in the intensity of current pain in the lower back during any body movement. The highest average intensity of current pain was among respondents employed in secondary health care institutions (2.37 ± 2.76), and the most prevalent work activities were prolonged standing, lifting weights and frequent bending of the trunk.

Some authors claim that work activities and greater physical load in secondary health care institutions are an important factor because daily manipulation of loads greater than 10 kg, which include lifting, pushing and pulling, significantly affects the increased risk of developing LBP [21, 22]. Manual work has been recognized as an important factor in the increased load on the lumbar intervertebral discs and the risk of LBP by the studies conducted by Schäfer

et al. 2023, Bláfoss et al. 2020 and Brauer et al. in 2020 [23–25].

The results of our research partially correlate with the results of these authors because specific work activities, biomechanical load and patient manipulations were potential risk factors for the development of LBP among health workers at the secondary level of health care.

Recent research has recognized the pace of work activity as a significant protective factor for LBP. Jia et al. (2022), Chu et al. (2021) and Veisi et al. (2020) claim that a break during work and self-assessment of the break can have a significant impact on reducing LBP risk factors, because autonomous work control and adequate rest can relax muscle tissue, reduce pressure on the lumbar intervertebral disc and prevent pain [26–28].

The aim of the study conducted by Yadav et al in 2020 was to determine the prevalence of risk factors for lower back pain in 190 health-care workers. In the total sample, 24.74% of respondents had LBP. Although standing (87.23%) and spinal flexion (78.72%) were the most common aggravating factors of pain, 95.74% of respondents with LBP cited rest as the most common alleviating factor [29].

The results of our research correlate with the claims stated. Among the examined groups, there were significant differences in lower back pain during any body movement ($\chi^2=8.120$; $p=0.017$). Tertiary level respondents had the lowest prevalence of pain, and most of the respondents of this level had frequent breaks (less than one hour of work) after the dominant work activity.

Demou et al argue that the healthcare sector represents one of the work environments with a high rate of work-related health problems, with musculoskeletal disorders being one of the leading causes of absenteeism. Analyzing the differences in the duration of sick leave among healthcare workers, these authors determined that 27% of absences from work, with an average duration of 43.5 days,

were related to musculoskeletal problems. It was especially pointed out that pain in the lower back was the leading health problem in the majority of absences from work lasting at least seven days [30].

Similar findings were shown in recently conducted research in Montenegro by Kovačević and Avdić. The aim of this research was to present the consequences of work-related musculoskeletal disorders affecting the lower back and cervical spine among 172 physiotherapists in Montenegro. The most frequently reported painful region among physiotherapists was the lower back (66.1%). Due to the presence of symptoms in the lower back area, 54.8% of respondents took therapy, 50% of respondents reduced their activities, 10.7% of respondents missed one or more working days, while 3.6% of respondents changed their workplace [31].

Our results partly correlate with the results of Kovačević and Avdić. In our study, there was no significant difference in absenteeism due to LBP. It showed that 17.7% of respondents at the tertiary level were absent from work for 1-7 days due to LBP, and physiotherapists were the most numerous health-care workers at the tertiary level of health care in the southern region of Montenegro.

Study limitations

This study has certain methodological limitations:

1. Study design: the study was conducted as a cross-sectional study. Such a design allows the determination of an association (correlation) between work activities and LBP but cannot confirm a cause-and-effect relationship (causality).

2. Measurement subjectivity: the study relied on an anonymous questionnaire and a numeric pain scale. Data on pain, work habits and absences from work were self-reported (subjective), making them susceptible to recall bias and subjective interpretation.

3. Geographical limitation: the sample is geographically limited to five health facilities in Boka Kotorska (Montenegro). This may affect the generalizability of the results to the entire population of healthcare workers in Montenegro or beyond.

Conclusion

Work activities are an important factor in low back pain in healthcare workers and vary depending on the workload at the healthcare level.

Standing, walking and carrying loads are influential work activities on low back pain in healthcare workers.

In the primary healthcare level, standing is prevalent due to the higher number of visits and shorter treatments. Influential work activities at the secondary and tertiary levels are walking, carrying loads and transferring patients due to the longer stay of patients in these institutions.

A positive correlation was found between the dominant activity interval and the current intensity of low back pain.

Additional research is needed to examine other contributing risk factors, as well as to implement preventive measures that would be tailored to the specific work requirements of these institutions.

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Ethical approval. The Ethics Committee of the Ministry of Health of Montenegro (No. 2-500/21-4983/2, 29.12. 2021), approved the protocol and informed voluntary

consent was obtained from all individual respondents and non-declinate to participate. The research was conducted according to the Declaration of Helsinki.

Conflicts of interest. The authors declare no conflict of interest.

*Abbreviations: LBP - Low back pain, NRS - Numeric Rating Scale

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Uticaj radnih aktivnosti na bol u donjem dijelu leđa zdravstvenih radnika

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Uvod. Bol u donjem dijelu leđa često je onesposobljavajući problem većine zdravstvenih radnika. Negativno utiče na zdravlje i radnu efikasnost. Može biti uzrokovan radnim aktivnostima. Cilj studije bio je ispitati koje radne aktivnosti predstavljaju faktore povezane sa pojavom bola u donjem dijelu leđa kod zdravstvenih radnika.

Metod. Među zdravstvenim radnicima zaposlenim u pet ustanova tri nivoa zdravstvene zaštite južne regije Crne Gore sprovedena je presječna studija (decembar 2021 – jul 2022. godine). Kriterijume uključivanja ispunila su 192 dobrovoljno uključena ispitanika različitih zdravstvenih profesija. Istraživački instrument bio je Anonimni upitnik od 15 pitanja.

Rezultati. Postoji značajna razlika u radnoj aktivnosti 63 ispitanika primarnog, 67 sekundarnog i 62 ispitanika tercijarnog nivoa, prosječne starosti $41,6 \pm 12,99$ godina. Na poslu uglavnom stoje (15,9%) ispitanici primarnog nivoa, ispitanici sekundarnog nivoa penju se uz stepenice s teretom, saginju se, stoje i nose teret (16,4%, 7,5%, 14,9%), a ispitanici tercijarnog nivoa pretežno sjede, saginju se i podižu veliki teret (33,9%, 4,8%, 4,8%). Među grupama postoji značajna razlika u intenzitetu bola ($p=0,003$), bolu pri bilo kom pokretu tijela ($p=0,017$) i intervalu radne aktivnosti ($p<0,001$), ali ne i u izostanku s posla zbog bola. Radne aktivnosti su najuticajnije u bolu 23,9% ispitanika sekundarnog nivoa.

Zaključak. Stajanje, hodanje i nošenje tereta su uticajne radne aktivnosti bola u donjem dijelu leđa kod zdravstvenih radnika. Pozitivna korelacija intervala radne aktivnosti i bola ukazuje na potrebu za ispitivanjem drugih doprinosećih faktora, ali i sprovođenjem preventivnih mjera koje bi bile prilagođene specifičnim radnim zahtjevima.

Ključne riječi: zdravstveni radnici, bol u donjem dijelu leđa, radne aktivnosti