



FATIGUE BASED ON THE SUBJECTIVE FEELING OF PEOPLE REPRESENTING SELECTED MEDICAL PROFESSIONS

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Abstract

Objectives: Fatigue can be the result of overexertion and overload. It occurs when the burdened body does not have enough time for regeneration and biological renewal. The aim of this study was analysis of fatigue based on the subjective feeling in physiotherapists, nurses, and paramedics. **Material and Methods:** The research covered 193 women and 107 men aged 30–60 years, including 100 physiotherapists, 100 nurses and 100 paramedics with higher education, employed in clinics and hospitals in the Podkarpackie Voivodeship, Poland. The research tool of choice was 30-item Research Committee on Industrial Fatigue *Fatigue Scale*, adapted into the Polish language by Paluch. The data were analyzed based on ANOVA Kruskal-Wallis test, Mann-Whitney U test and Spearman's rank correlation. **Results:** Values determining frequency of decrease in activity were higher in nurses than in physiotherapists ($p < 0.001$) and paramedics ($p = 0.005$). Physiotherapists and nurses showed statistically significant positive associations of all fatigue indices with age and seniority. Sex-related differences in the frequency of physical fatigue symptoms have been noted ($p = 0.044$). Among people working in outpatient clinics and hospitals there were statistically significant differences in the frequency of decrease in activity ($p = 0.001$) and general level of fatigue ($p = 0.031$). **Conclusions:** In nurses and physiotherapists, the frequency of experiencing ailments increases with age and work experience. This suggests that in the case of these professions it is important to quick identification of signs of fatigue and taking actions to prevent its worsening. Women experience fatigue more often, so they especially need to take steps to prevent and, if necessary, treat this condition. Hospitals should be an area of special involvement in the process of implementing programs to counteract fatigue of employees in the medical services sector. Int J Occup Med Environ Health. 2024;37(1):72–83

Key words:

motivation, sleep deprivation, medical staff, job satisfaction, health status, work schedule tolerance

INTRODUCTION

Fatigue is a condition often experienced in the working population. The degree of fatigue is considered an integral effect of professional work. If the effort incurred during work exceeds the adaptive capacity of the body with lack

of proper regeneration, the employee returns to his duties the next day with a sense of fatigue [1–3].

A universal definition of fatigue is difficult to find in the scientific literature, despite the fact that it is commonly experienced. Difficulties in defining it precisely result

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from its multidimensional and complex nature. Fatigue can be considered as a defensive regulator of human activity, both in the physiological and psychological aspects. The defensive role manifests itself when continuing the activity exceeds the psychophysical capabilities of the human body. This term is often used to describe an internal state characterized by a temporary decrease in the ability to perform work or other activity as a consequence of previously incurred effort [4–6].

The factors determining the incidence and severity of fatigue are related to the body's capacity (health, activity level, sleep), environment (noise level, humidity, temperature) and psychological predispositions, such as the level of interest in the activity performed, stress, frustrations [2].

The dominant symptom of fatigue is the subjective sense of exhaustion, in the form of an unpleasant sensation that exceeds the individual adaptability of a person. The symptoms also include decreased attention, deterioration of neuromuscular coordination, as well as a sense of heaviness and slowness. A person experiencing fatigue faces a problem with developing new motor routines and demonstrates deteriorated conditioned reflexes. This translates into their functioning and disturbs the rhythm of work [5–7].

Working in the medical sector is particularly prone to fatigue. It is particularly full of stress factors resulting from its structure and organization. It requires contact with people in need, suffering or conflict [1,3].

Physiotherapists are subjected to overloads resulting from excessive physical work, in uncomfortable positions, often at unusual hours, and at an uneven pace. They take care of many patients with different needs, and the specificity of this profession requires constant improvement of qualifications [8,9]. Nursing staff experience physical and mental burdens related to lifting patients, responsibility related to performing procedures, the need to take quick decisions in situations where the health and life of patients are at risk,

being surrounded by suffering and death. This job requires full availability, also during weekends and holidays, regardless of the time of day [5,6,10,11]. In turn, the profession of a paramedic requires being constantly ready for action. It is characterized by haste, strong emotions, stress and shift work. The health condition of paramedics is influenced by aggression and violence on the part of patients, contact with the suffering and high responsibility associated with making difficult decisions [7,12,13].

Fatigue in medical professionals can have a negative impact on relationships with patients and interfere with the course of treatment or therapy [2–4]. The review of the literature indicates that there are known studies on fatigue among medical professionals. Most of them focus on assessing the frequency and level of advancement of this condition, selectively in nurses or paramedics [1,2,4–7,10,11]. However, there is a lack of comparative studies on fatigue among representatives of various medical workers groups. This was the reason for undertaking the subject of the study, the aim of which was analysis of fatigue based on the subjective feeling in physiotherapists, nurses, and paramedics.

Research questions:

- Is there a differentiation in the indicators of fatigue among representatives of selected medical professions?
- What are the relationships between the indicators of fatigue and age, daily number of working hours and work experience of the subjects?
- Are there sex-related differences in the values of fatigue indicators?
- Do the values of fatigue indicators differentiate people working in outpatient clinics and hospitals?

MATERIAL AND METHODS

Participants

Cross-sectional study in April 2020 involved 300 people (193 women and 107 men) aged 30–60 years (mean (M) \pm standard deviation (SD) 40.31 \pm 8.92 years), including

Table 1. Characteristics of medical professionals surveyed in the study on fatigue based on the subjective feeling, Podkarpackie Province, Poland, April 2020

Variable	Participants (N = 300)		
	physiotherapists (N = 100)	nurses (N = 100)	paramedics (N = 100)
Sex [n (%)]			
women	74 (74.0)	100 (100.0)	19 (19.0)
men	26 (26.0)	0 (0.0)	81 (81.0)
Age [years] (M±SD)	39.12±7.43	44.56±9.49	37.26±8.18
Level of education [n (%)]			
higher	100 (100.0)	100 (100.0)	100 (100.0)
secondary	0 (0.0)	0 (0.0)	0 (0.0)
vocational	0 (0.0)	0 (0.0)	0 (0.0)
Workplace [n (%)]			
clinic	52 (52.0)	11 (11.0)	0 (0.0)
hospital	48 (48.0)	89 (89.0)	100 (100.0)
Working time [h/day] (M±SD)	8.23±1.27	11.37±1.57	12.02±1.35
Seniority [years] (M±SD)	15.48±7.42	19.55±9.54	15.41±8.19
Seniority [n (%)]			
5–10 years	42 (42.0)	28 (28.0)	47 (47.0)
11–20 years	39 (39.0)	25 (25.0)	32 (32.0)
21–30 years	15 (15.0)	25 (25.0)	14 (14.0)
31–35 years	4 (4.0)	22 (22.0)	7 (7.0)

100 physiotherapists, 100 nurses, and 100 paramedics with higher education, employed in randomly selected clinics (63 surveyed people) and hospitals (237 surveyed people) in the Podkarpackie Province, Poland. The respondents' work experience was within the range 5–35 years (M±SD 16.81±8.65 years).

Table 1 presents sociodemographic and clinical characteristics of the respondents.

Design

Sociodemographic and clinical data were collected through the self-designed questionnaire. The research tool of choice was *Fatigue Scale* developed by the Research Committee on Industrial Fatigue (RCIF) of the Japan Society for Occupa-

tional Health (JSOH) [14], adapted into the Polish language by Paluch [15]. The questionnaire consisted of 30 grouped items (constituting symptoms of fatigue), divided into 3 equal domain. The symptoms included in domain I concerned a decrease in activity (e.g. drowsiness, slowness, heaviness), in domain II – decreased motivation (e.g., nervousness, absentmindedness, trouble concentrating), and domain III – physical fatigue (e.g., tremor of the limbs, pain). The responses are comprised in a 5-point scale (score ranging 0–4 points for each question). Respective domain scores are scaled in a negative direction (i.e., the higher scores indicate the higher fatigue).

From the obtained data, the score and percentage values of fatigue were calculated in individual symptom catego-

ries, as well as the general fatigue index, according to the formula:

$$\begin{aligned} \text{Percentage rate of occurrence of fatigue symptoms} = \\ = \frac{\text{number of points}}{\text{maximum number of points}} \times 100\% \end{aligned} \quad (1)$$

where:

the number of points – the sum of points for the group I, II or III,

the maximum number of points – $4 \times 10 \times$ number of surveyed people.

The higher the percentage, the higher the degree of fatigue [14,15]. The Cronbach's α value for this scale is 0.921 [4].

The research was carried out with the use of a direct probing method. An invitation (with the consent of the managerial staff of individual workplaces) to participate in the study was directed to employees aged 30–60 years. The selected group was then verified in terms of individual compliance with the inclusion criteria assumed for the study protocol: 30–60 years age range; completion of higher education, qualifications to practice as a physiotherapist, nurse, or paramedic; work as a physiotherapist, nurse, or paramedic; min. 5 years of work experience in the profession; written informed consent for participation in the study protocol. People with physical or mental illness were duly excluded from the study. All respondents were given specific instructions on how to fill in the questionnaires, and returned them as soon as they had responded to all the questions.

Ethics approval

The research was carried out with the aid of a diagnostic survey, following endorsement by the Bioethics Review Committee, University of Rzeszow, Poland (approval Ref. No. 4/01/2020), and a written informed consent of all respondents. All procedures were carried out in full com-

pliance with the Helsinki Declaration as revised in 2013. The survey was fully anonymous, and was conducted in conformity to the rules of research ethics, in entities and institutions which agreed to participate.

Statistics

Consistency of pertinent variables with reference values in normal distribution was verified by means of the Shapiro-Wilk test. The fatigue in 3 groups of symptoms (decrease of activity, decreased motivation, physical fatigue), within the group of physiotherapists, nurses, and paramedics, respectively, was compared using the ANOVA Kruskal-Wallis test. With regard to statistically significant differences, Dunn's *post hoc* test with Bonferroni adjustment was used. In order to have the fatigue in 3 groups of symptoms compared between women and men, and working in clinics and hospitals the Mann-Whitney U test was applied. The Spearman's rank correlation was used to analyze the relationships between fatigue indices and age, daily number of working hours and seniority. The statistical significance was set at $p < 0.05$. The Statistica application, v. 13.1 PL (StatSoft Inc., Tulsa, OK, USA; StatSoft, Kraków, Poland) was used to process the test results.

RESULTS

The data in Table 2 indicate a statistically significant intergroup variation in the values determining the frequency of decrease in activity ($p < 0.001$). These values were higher in nurses than in physiotherapists ($p < 0.001$) and paramedics ($p = 0.005$), and in paramedics in relation to physiotherapists ($p = 0.020$). Statistically significant intergroup differences in the frequency of decreased motivation were noted. This variable was higher in nurses than in physiotherapists ($p < 0.001$) and paramedics ($p = 0.019$). Statistically significant differences between the groups in the frequency of physical fatigue symptoms were found ($p < 0.001$). These values were higher in nurses than in physiotherapists ($p = 0.001$) and paramedics ($p < 0.001$). There was a statis-

Table 2. Comparison of fatigue indicators among representatives of selected medical professions, Podkarpackie Province, Poland, April 2020

Fatigue indicator	M±SD	Max–min.	Q ₂₅	Me	Q ₇₅	H	p	Post hoc test		
								physiotherapists	nurses	paramedics
Decrease in activity [%]						34.46	<0.001*			
physiotherapists	41.22±20.08	85.00–0.00	25.00	42.50	55.00			–	<0.001*	0.020*
nurses	59.85±24.04	100.00–12.50	40.00	65.00	80.00			<0.001*	–	0.005*
paramedics	49.35±17.30	82.50–7.50	37.50	50.00	62.50			0.020*	0.005*	–
Decreased motivation [%]						19.08	<0.001*			
physiotherapists	39.10±21.20	87.50–0.00	25.00	38.75	50.00			–	<0.001*	0.344
nurses	52.08±22.90	100.00–5.00	35.00	51.25	65.00			<0.001*	–	0.019*
paramedics	42.70±15.01	77.50–5.00	32.50	42.50	52.50			0.344	0.019*	–
Physical fatigue [%]						23.21	<0.001*			
physiotherapists	44.50±20.76	87.50–0.00	30.00	43.75	57.50			–	0.001*	0.952
nurses	56.10±22.59	100.00–7.50	40.00	56.25	72.50			0.001*	–	<0.001*
paramedics	41.25±17.53	87.50–0.00	30.00	42.50	55.00			0.952	<0.001*	–
Overall level of fatigue [%]						28.97	<0.001*			
physiotherapists	41.61±18.00	84.17–8.33	28.33	40.83	52.08			–	<0.001*	0.552
nurses	56.01±21.46	100.00–10.00	40.00	57.08	70.00			<0.001*	–	<0.001*
paramedics	44.43±13.76	72.50–10.83	36.25	45.42	53.33			0.552	<0.001*	–

H – ANOVA Kruskal-Wallis test statistics.

* p < 0.05.

tically significant inter-group variation in overall levels of fatigue ($p < 0.001$). These values were higher in nurses than in physiotherapists ($p < 0.001$) and paramedics ($p < 0.001$). In physiotherapists and nurses, statistically significant positive relations of all fatigue indices with age and seniority were noted. In the case of physiotherapists, the incidence of sense of decreased motivation, and in the case of nurses, the frequency of experiencing a decrease in activity, symptoms of physical fatigue and general fatigue level positively correlated with the daily number of working hours. In the case of paramedics, there were no statistically significant relationships (Table 3).

Data in Table 4 indicate that statistically significant sex-related differences in the frequency of physical fatigue symptoms were found ($p = 0.044$). These values were higher in women.

Among people working in outpatient clinics and hospitals there were statistically significant differences in the frequency of decrease in activity ($p = 0.001$) and general level of fatigue ($p = 0.031$). The values for these variables were higher in people employed in hospitals.

DISCUSSION

The analysis of own research showed diversity of fatigue indicators among representatives of selected medical professions. The subjective feeling of ailments is most common among nurses, while the subjective assessment of improvement in fitness is more common among paramedics in terms of physiotherapists. The literature lacks comparative studies of the level of fatigue in representatives of various medical professions. Most authors assessed fatigue selectively, in representatives of specific

Table 3. Relationships of fatigue indices with age, daily number of working hours and seniority medical professionals surveyed in the in the study on fatigue based on the subjective feeling, Podkarpackie Province, Poland, April 2020

Fatigue indicator	Physiotherapists		Nurses		Paramedics	
	R	p	R	p	R	p
Age						
decrease in activity	0.41	<0.001*	0.58	<0.001*	0.05	0.644
decreased motivation	0.31	0.002*	0.50	<0.001*	0.01	0.886
physical fatigue	0.40	<0.001*	0.41	<0.001*	0.16	0.112
overall level of fatigue	0.45	<0.001*	0.54	<0.001*	0.08	0.454
Daily number of working hours						
decrease in activity	0.13	0.189	0.21	0.040*	-0.03	0.751
decreased motivation	0.25	0.011*	0.15	0.133	0.02	0.807
physical fatigue	0.15	0.128	0.22	0.030*	0.07	0.468
overall level of fatigue	0.18	0.075	0.21	0.038*	0.01	0.886
Seniority						
decrease in activity	0.35	<0.001*	0.61	<0.001*	0.18	0.072
decreased motivation	0.26	0.008*	0.52	<0.001*	0.09	0.377
physical fatigue	0.36	<0.001*	0.42	<0.001*	0.17	0.091
overall level of fatigue	0.40	<0.001*	0.56	<0.001*	0.16	0.109

R – Spearman's correlation coefficient.

* p < 0.05.

occupations. Comparison of the results of this study with the studies of other authors indicates a large similarity in the subjective assessment of fatigue, in terms of the frequency and diversity of experienced symptoms. Krzemińska et al. [10] noted decreased motivation and physical fatigue in nurses employed in intensive care units. Subjects reported feeling thirsty, heavy legs, wanting to lie down, nervousness, and back pain. In turn, Kwiecień-Jaguś and Wujtewicz [11] noted leg fatigue, desire to lie down, eyestrain, distraction, impatience, thirst, difficulty in focusing attention and back pain as the most common symptoms in anesthesiology and intensive care nurses of wards. In contrast, Sofianopoulos et al. [7] found that 9 out of 10 paramedics demonstrated symptoms of fatigue over the last 6 months. The subjects complained of poor quality of sleep and a constant feeling of drowsi-

ness, which may have had a negative impact on work performance. Kulczycka et al. [1] recognized that the main indicators of physical fatigue in paramedics employed in emergency stations are fatigue and back pain. The subjects were also accompanied by headaches and visual fatigue, and to a lesser extent dizziness and shortness of breath. Research by Żurowska-Wolak et al. [12] showed that paramedics employed in emergency services and hospital emergency departments were very tired after work in case of 44% of the respondents, and exhausted in 35% of the respondents. The subjects also presented a decrease in activity and decreased motivation. Own research shows that physiotherapists were characterized by the lowest level of overall fatigue, as well as in terms of decreased activity and motivation. Perhaps this is due to the fact that physiotherapists are a profes-

Table 4. Sex-related and workplace-related comparison of fatigue indicators values among medical professionals surveyed in the in the study on fatigue based on the subjective feeling, Podkarpackie Province, Poland, April 2020

Fatigue indicator	M±SD	Max–min.	Q ₂₅	Me	Q ₇₅	Z	p
Sex							
decrease in activity						–1.00	0.316
women	51.15±24.27	100.00–0.00	50.00	50.00	70.00		
men	48.32±16.97	7.50–7.50	50.00	50.00	62.50		
decreased motivation						–0.08	0.932
women	44.99±22.85	100.00–0.00	27.50	45.00	60.00		
men	43.97±16.06	87.50–5.00	32.50	42.50	52.50		
physical fatigue						–2.01	0.044*
women	49.38±22.72	100.00–0.00	32.50	50.00	65.00		
men	43.50±17.99	87.50–0.00	32.50	45.00	57.50		
overall level of fatigue						–1.14	0.253
women	48.51±21.12	100.00–8.33	32.50	46.67	62.50		
men	45.26±14.30	83.33–10.83	36.67	45.00	53.33		
Work place							
decrease in activity						–3.32	0.001*
clinic	41.83±20.83	85.00–7.50	25.00	42.50	55.00		
hospital	52.35±21.77	100.00–0.00	37.50	52.50	67.50		
decreased motivation						–1.66	0.094
clinic	40.99±17.56	85.00–7.50	25.00	37.50	52.50		
hospital	45.59±21.34	100.00–0.00	32.50	45.00	57.50		
physical fatigue						–0.74	0.456
clinic	44.96±16.83	82.50–0.00	32.50	45.00	57.50		
hospital	47.90±22.34	100.00–0.00	32.50	47.50	60.00		
overall level of fatigue						–2.15	0.031*
clinic	42.59±16.49	84.17–10.83	27.50	40.83	54.17		
hospital	48.61±19.46	100.00–8.33	36.67	47.50	59.17		

Z – Mann-Whitney U test statistics.

* p < 0.05.

sional group which, due to the content of the curricula implemented during studies, is better at compensating for the effects of fatigue. Data in the literature indicate that this occupational group is more aware of the need and benefits of physical activity. Research by McPhail and Waite [16] has shown that physical fatigue is a major concern for physiotherapists and that factors contribut-

ing to musculoskeletal injuries include repetitive movements, incorrect body postures and physical stress. However, despite this, physically active physiotherapists have a better quality of life and suffer from less health problems. These data suggest the need to support the regeneration of medical staff. To this end, employers should facilitate access to places of recreation and multi-specialist

support. Elimination of disturbing symptoms of fatigue, initiated at an early stage, is the most effective.

The authors have demonstrated that the frequency of fatigue increases in nurses and physiotherapists with age, while paramedics lack similar associations. Also Kwiecień-Jaguś and Wujtewicz [10], as well as Krzemińska et al. [11] found that the level of fatigue in the nursing profession increases with age. In turn, Jaworek [17] showed that younger nurses were characterized by a greater degree of fatigue than older ones, and de Araújo and Alchieri [8] noted an increase in the level of stress, mental exhaustion and apathy with age. With regard to paramedics, Kulczycka et al. [1] came to different conclusions. The authors in this professional group observed an increase in pain and fatigue proportionally to age. Courtney et al. [18] recognized that ambulance workers, regardless of age and gender, are at risk of fatigue, depression and poor sleep quality.

The research shows that in nurses and physiotherapists, the frequency of experiencing ailments increases with age and work experience. In case of physiotherapists, the frequency of feeling less motivated and in case of nurses, the frequency of feeling a decrease in activity, symptoms of physical fatigue and the overall level of fatigue positively correlated with the daily number of working hours. Perhaps this is due to the fact that nurses performed their duties regardless of the time of day, in a 12-hour shifts, while physiotherapists could be overloaded with physical work. Zużewicz and Prędecka [19] also emphasized that fatigue in medical professions is affected by working long hours, especially at night. Many hours of activity causes drowsiness, irritability, problems with concentration, muscle weakness, which in turn is a risk of diagnostic and medical errors. Similarly, Chen et al. [6] recognized that long hours and shift work generate fatigue and, consequently, may have a negative impact on clinical decisions and work quality. Smith-Miller et al. [20] found that working shifts longer than 12 h contributes to increased

fatigue and errors. Barker and Nussbaum [5] showed that nurses on long shifts reported severe mental fatigue that outweighed physical symptoms. Jaworek [17] came to interesting conclusions, because nurses with more professional experience were characterized by better mental health, while younger ones experienced work-related stress more. Similarly, Eldevik et al. [2] suggest that nurses with longer work experience are more experienced and have developed better strategies for coping with fatigue and other work-related health problems. According to the authors' study, the frequency of decreased motivation increases with the seniority of physiotherapists. Similarly, Iqbal and Alghadir [21] observed that physiotherapists working >30 h/week and at least 3 h/day more often experience pain, which causes a decrease in activity, dissatisfaction with work, poorer contact with the patient, and in extreme cases sickness absence. Also, Ho et al. [3], as a result of a study of 1833 hospital workers in Taiwan, found that younger, inexperienced workers more often reported work-related fatigue compared to older workers. Anyfantis and Biska [22] in Greek physiotherapists showed positive associations of seniority with the incidence of diseases of the musculoskeletal system. Brattig et al. [9] emphasized that the possibility of setting working hours and breaks improves the professional satisfaction of physiotherapists. This approach seems justified. It suggests the need for meetings between medical staff and superiors in order to get to know employees' expectations, solve current problems and determine proposals for solving them, for example by shortening working time or changing the schedule. Regeneration in the workplace is important, which can be achieved through short and frequent breaks and the use of relaxation techniques. It seems that the best solution is to prevent the occurrence of negative symptoms of fatigue. In this regard, emphasis should be placed on the lifestyle of representatives of medical professions, because its pace and quality are not conducive to maintaining proper health condition. Educa-

tion on proper sleep hygiene, stress reduction, a balanced diet and the need for physical activity is important. Implementation of good habits should start already during education at major studies. Of particular importance is education on the threats in the form of physical and mental overloads, fatigue, stress and ways to overcome them.

The authors found that in the case of paramedics, fatigue rates are unrelated to age, daily working hours and seniority. This is contrary to the report by Donnelly et al. [23], who in this occupational group noted an increase in stress resulting from exposure to aggravating and dangerous factors proportionally to the increase in seniority.

In own material sex-related differences in the frequency of physical fatigue symptoms have been noted. Women have a higher incidence of fatigue. Both women and men can perform medical professions, however, statistics, this study and research by other authors indicate certain predispositions and uneven proportions in practicing these professions by each sex. The majority of nursing staff are women, while the paramedics are mostly men. In the profession of physiotherapist, these proportions are at a similar level. Ho et al. [3] recognized that gender has an impact on the level of perceived fatigue in healthcare professionals. Similarly, Kulczycka et al. [1] observed that sex is an important determinant of fatigue. Female paramedics were more likely than male paramedics to experience fatigue, dizziness, pain, discomfort, shoulder numbness, and infections. Nordin et al. [24] showed that among physiotherapists working in 1 hospital in Malaysia, women were more likely to experience musculoskeletal injuries at work. According to the authors, performing tasks related to patient care has a negative impact on their health, mainly due to their worse physical condition than men. Stassen et al. [25] concluded that gender does not determine the level of occupational burnout in paramedics.

Own research has shown that the values of fatigue indices differentiated people working in outpatient clinics and hospitals. Hospital workers have a higher incidence

of symptoms of decreased activity, physical fatigue, and overall levels of fatigue, than people working in outpatient clinics. Barker and Nussbaum [5], as a result of research on nurses, found that the work environment has a strong impact on the subjective sense of fatigue in nurses. In the study of Lambrou et al. [26], health care workers claimed that motivation and professional satisfaction was dependent on the workplace. The determinants of well-being for them were friendly interpersonal relations, job security and wards equipped with specialized equipment. Niewiadomski et al. [27] observed that self-employed people employed in non-public health care institutions experienced less fatigue and enjoyed greater professional satisfaction. In turn, Pavlakis et al. [28] concluded that Cyprus physiotherapists employed in private facilities experience greater emotional exhaustion and a decrease in motivation than those working in the public sector. According to these authors, physiotherapists working privately form closer relationships with patients, which results in an increased workload and exposes them to emotional and physical health effects.

To sum up, the problem of fatigue is present in the lives of people representing medical professions. Fatigue not compensated by proper rest carries a number of risks in the form of chronic fatigue syndrome, professional burnout, excessive stress, and other negative health effects. Therefore, there is a need for training and specialized support. However, Fischer et al. [29] showed that only one-third of physiotherapists experience support from employers, and more than half require psychological support. Similarly, Rice et al. [30] indicated that paramedics feel a lack of support from their superiors. The authors propose solutions that would improve well-being, support psychophysical fitness, neutralize fatigue and work-related stress. This is access to free gyms, psycho-physical health checks and training in ergonomics at work. They assume that at the beginning of their professional career, the employee makes the most mistakes, which have nega-

tive and sometimes irreversible health consequences that may exclude them from the profession. The health check will identify workers at risk of fatigue.

Despite the fact that the collected results are a set of subjective opinions, it is justified to conduct further research on the issue of fatigue among representatives of medical professions. Data on the causes, consequences and health effects of fatigue can be important. Attention should be paid to the creation of appropriate measurement methods, prevention and possible treatment methods, the search for effective solutions to reduce the scale of this phenomenon, as well as changes in the organization of work in the medical sector.

The scope of this cross-sectional study has been narrowed down to 1 area, which may be a limitation of the study. Future research could be planned in the form of a controlled experiment, extended to other regions of the country. Such a procedure will allow for a more detailed understanding of the cause and effect relationships regarding fatigue among employees representing the medical services sector.

CONCLUSIONS

There is a diversity of fatigue indicators among representatives of selected medical professions. The subjective feeling of ailments is most common among nurses, while the subjective assessment of improvement in fitness is more common among paramedics in terms of physiotherapists. These differences may be due to the different characteristics of work.

In nurses and physiotherapists, the frequency of experiencing ailments increases with age and work experience. In case of physiotherapists, the frequency of feeling less motivated and in case of nurses, the frequency of feeling a decrease in activity, symptoms of physical fatigue and the overall level of fatigue positively correlated with the daily number of working hours. This suggests that in the case of these professions it is important to quick iden-

tification of signs of fatigue and taking actions to prevent its worsening.

Sex-related differences in the frequency of physical fatigue symptoms have been noted. Women experience fatigue more often, so they especially need to take steps to prevent and, if necessary, treat this condition.

The values of fatigue indices differentiated people working in outpatient clinics and hospitals. Hospital workers have a higher incidence of symptoms of decreased activity, physical fatigue, and overall levels of fatigue, than people working in outpatient clinics. Therefore, hospitals should be an area of special involvement in the process of implementing programs to counteract fatigue of employees in the medical services sector.

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REFERENCES

1. Kulczycka K, Grzegorzczuk-Puzio E, Stychno E, Piasecki J, Strach K. Wpływ pracy na samopoczucie ratowników medycznych. *Med Og Nauk Zdr.* 2016;22(1):66-71. <https://doi.org/10.5604/20834543.1198726>.

2. Eldevik MF, Flo E, Moen BE, Pallesen S, Bjorvatn B. Insomnia, excessive sleepiness, excessive fatigue, anxiety, depression and shift work disorder in nurses having less than 11 hours in-between shifts. *PLoS One*. 2013;8(8):e70882. <https://doi.org/10.1371/journal.pone.0070882>.
3. Ho JC, Lee MB, Chen RY, Chen CJ, Chang WP, Yeh CY, Lyu SY. Work-related fatigue among medical personnel in Taiwan. *J Formos Med Assoc*. 2013;112(10):608-15. <https://doi.org/10.1016/j.jfma.2013.05.009>.
4. Ramdan IM. Measuring work fatigue on nurses: a comparison between Indonesian version of Fatigue Assessment Scale (FAS) and Japanese Industrial Fatigue Research Committee (JIFRC) Fatigue Questionnaire. *J Kep Padjadjaran*. 2019;7(2):143-53. <https://doi.org/10.24198/jkp.v7i2.1092>.
5. Barker LM, Nussbaum MA. Fatigue, performance and the work environment: a survey of registered nurses. *J Adv Nurs*. 2011;67(6):1370-82. <https://doi.org/10.1111/j.1365-2648.2010.05597.x>.
6. Chen J, Davis KG, Daraiseh NM, Pan W, Davis LS. Fatigue and recovery in 12-hour dayshift hospital nurses. *J Nurs Manag*. 2014;22(5):593-603. <https://doi.org/10.1111/jonm.12062>.
7. Sofianopoulos S, Williams B, Archer F, Thompson B. The exploration of physical fatigue, sleep and depression in paramedics: a pilot study. *J Emerg Prim Health Care*. 2011;9(1):1-33. <https://doi.org/10.33151/ajp.9.1.37>.
8. de Araújo Silva TL, Alchieri JC. Socioeconomic and demographic aspects related to stress and the burnout syndrome among Brazilian physiotherapists. *Salud Ment*. 2014;37(3):233-8.
9. Brattig B, Schablon A, Nienhaus A, Peters C. Occupational accident and disease claims, work-related stress and job satisfaction of physiotherapists. *J Occup Med Toxicol*. 2014;9(1):36. <https://doi.org/10.1186/s12995-014-0036-3>.
10. Kwiecień-Jaguś K, Wujtewicz M. Analiza obciążenia pracą personelu pielęgniarskiego oddziałów anestezjologii i intensywnej terapii na podstawie polskojęzycznej wersji kwestionariusza japońskiego. *Probl Hig Epidemiol*. 2015; 96(1):128-37.
11. Krzemińska S, Guzik N, Borodzicz AM, Bąk E, Arendarczyk M. Assessing fatigue among ICU nurses using the Yoshitake fatigue questionnaire – a pilot study. *J Educ Health Sport*. 2018; 8(6):103-12. <https://doi.org/10.5281/zenodo.1252500>.
12. Żurowska-Wolak M, Wolak B, Mikos M, Juszczak G, Czerw A. Stres i wypalenie zawodowe w pracy ratowników medycznych. *J Educ Health Sport*. 2015;5(7):43-50. <https://doi.org/10.5281/zenodo.19112>.
13. Jasielska A, Ziarko M. [General and specific individual post-traumatic stress disorder-related mechanisms among paramedics]. *Med Pr*. 2019;70(1):53-66. <https://doi.org/10.13075/mp.5893.00757>. Polish.
14. Saito Y, Kogi K, Kashiwagi S. Factors underlying subjective feeling of fatigue. *J Sci Lab*. 1970;46:205-24.
15. Paluch R. Ocena zmęczenia na podstawie subiektywnego odczucia – kwestionariusz japoński. *Bezp Pr*. 1985;7-8:3-6.
16. McPhail SM, Waite MC. Physical activity and health-related quality of life among physiotherapists: a cross sectional survey in an Australian hospital and health service. *J Occup Med Toxicol*. 2014;9(1):1. <https://doi.org/10.1186/1745-6673-9-1>.
17. Jaworek M. Czynniki związane z pracą a zespół zmęczenia skumulowanego w grupie zawodowej pielęgniarek. Kraków: Wydawnictwo UJ; 2010.
18. Courtney JA, Francis AJ, Paxton SJ. Caring for the country: fatigue, sleep and mental health in Australian rural paramedic shiftworkers. *J Community Health*. 2013;38(1):178-86. <https://doi.org/10.1007/s10900-012-9599-z>.
19. Zużewicz K, Prędecka A. Wymiar czasu pracy kontra zdrowie (Przegląd doniesień naukowych). *Zeszyty Naukowe SGSP* 2018;66(1):149-64.
20. Smith-Miller CH, Shaw-Kokot J, Curro B, Jones CHB. An integrative review: fatigue among nurses in acute care settings. *JONA*. 2014;44(9):487-94. <https://doi.org/10.1097/NNA.000000000000104>.
21. Iqbal Z, Alghadir A. Prevalence of work-related musculoskeletal disorders among physical therapists. *Med Pr*. 2015; 66(4):459-69. <https://doi.org/10.13075/mp.5893.00142>.

22. Anyfantis ID, Biska A. Musculoskeletal disorders among Greek physiotherapists: traditional and emerging risk factors. *Saf Health Work*. 2018;9(3):314-8. <https://doi.org/10.1016/j.shaw.2017.09.003>.
23. Donnelly EA, Bradford P, Davis M, Hedges C, Klingel M. Predictors of posttraumatic stress and preferred sources of social support among Canadian paramedics. *CJEM* 2016; 18(3):205-12. <https://doi.org/10.1017/cem.2015.92>.
24. Nordin NA, Leonard JH, Thye NC. Work-related injuries among physiotherapists in public hospitals: a South-east Asian picture. *Clinics (Sao Paulo)*. 2011;66(3):373-8. <https://doi.org/10.1590/s1807-59322011000300002>.
25. Stassen W, Van Nugteren B, Stein C. Burnout among advanced life support paramedics in Johannesburg, South Africa. *Emerg Med J*. 2013;30(4):331-4. <https://doi.org/10.1136/emermed-2011-200920>.
26. Lambrou P, Kontodimopoulos N, Niakas D. Motivation and job satisfaction among medical and nursing staff in a Cyprus public general hospital. *Hum Resour Health*. 2010; 8:26. <https://doi.org/10.1186/1478-4491-8-26>.
27. Niewiadomski TJ, Reglińska J, Biskupska M. Ocena zadowolenia z pracy fizjoterapeutów – badania wstępne. *Piel Pol*. 2012;43(1):44-8.
28. Pavlakis A, Raftopoulos V, Theodorou M. Burnout syndrome in Cypriot physiotherapists: a national survey. *BMC Health Serv Res*. 2010;10:63. <https://doi.org/10.1186/1472-6963-10-63>.
29. Fischer M, Mitsche M, Endler PCH, Mesenholl-Strehler E, Lothaller H, Roth R. Burnout in physiotherapists: Use of clinical supervision and desire for emotional closeness or distance to clients. *Int J Ther Rehabil*. 2013;20(11):550-8. <https://doi.org/10.12968/ijtr.2013.20.11.550>.
30. Rice V, Glass N, Ogle K, Parsian N. Exploring physical health perceptions, fatigue and stress among health care professionals. *J Multidiscip Healthcare*. 2014;7:155-61. <https://doi.org/10.2147/JMDH.S59462>.