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PRACA ORYGINALNA
ORIGINAL PAPER

Back pain syndrome in nurses in Podkarpackie hospitals

Zespół bólowy kręgosłupa u pielęgniarek w podkarpackich szpitalach

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ABSTRACT

INTRODUCTION: Back pain syndromes constitute a serious health problem. They most often affect people between 40 and 60 years of age, but it also happens that they appear before the age of 30. They are a frequent problem in nurses. The etiology of these ailments is multifactorial. The main causes are physical stresses on the spine: lifting, a forced posture, and obesity. Human neurophysiological predispositions and social conditions also play an important role. The study attempts to determine whether the respondents know the cause of their ailments, and what the prevention of this disease, knowledge of the principles of ergonomics and pro-health measures should be.

MATERIAL AND METHODS: In this work, the frequency of back pain syndromes in nurses in two hospitals in the Podkarpackie region was observed. The author's own questionnaire and anthropometric research were used.

RESULTS: Pain occurred in 89% of the respondents, and the main causes of these ailments were physical stress, overweight and low physical activity. The respondents knew the principles of ergonomics, but did not use them at work, and the length of service was not statistically significant. The lack of training and appropriate equipment was noted. Stress factors had an effect on back pain only in 13% of the respondents.

CONCLUSIONS: Back pain occurs in 90% of the surveyed nurses in hospitals in the Podkarpackie region and has the features of an occupational disease. The respondents know the principles of ergonomics and express their willingness to deepen their knowledge on this subject. This knowledge should be supplemented with the basic understanding of active physiotherapy and neurophysiology due to the role of psychological factors in the treatment of chronic pain.

KEY WORDS

back pain, nurses, ergonomics, overweight, Podkarpackie

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STRESZCZENIE

WSTĘP: Zespoły bólowe kręgosłupa są ogromnym problemem zdrowotnym. Dotyczą najczęściej osób pomiędzy 40 i 60 rokiem życia, ale zdarza się, że występują jeszcze przed 30 rokiem życia. U pielęgniarek są powszechnym zjawiskiem. Etiologia tych dolegliwości jest wieloczynnikowa. Zasadniczą przyczyną są obciążenia fizyczne kręgosłupa: dźwiganie, wymuszona postawa ciała oraz nadwaga. Istotną rolę odgrywają też predyspozycje neurofizjologiczne człowieka i uwarunkowania społeczne. W pracy podjęto próbę ustalenia, czy osoby badane znają przyczynę swoich dolegliwości, wiedzą, jaka powinna być profilaktyka tego schorzenia, znają zasady ergonomii oraz działania prozdrowotne w tym zakresie.

MATERIAŁ I METODY: W pracy określono częstość występowania zespołów bólowych kręgosłupa u pielęgniarek w dwóch szpitalach na Podkarpaciu. Posłużono się autorską ankietą i badaniami antropometrycznymi.

WYNIKI: Ból występował u 89% badanych, a zasadniczą przyczyną dolegliwości były obciążenia fizyczne, nadwaga i niska aktywność fizyczna. Osoby badane znały zasady ergonomii, ale nie wykorzystywały ich w pracy, a staż nie miał tu statystycznie istotnego znaczenia. Odnotowano brak szkoleń i odpowiedniego sprzętu. Jedynie u 13% badanych czynniki stresowe miały wpływ na dolegliwości bólowe kręgosłupa.

WNIOSKI: Ból pleców występuje u 90% badanych w szpitalach na Podkarpaciu i ma cechy choroby zawodowej. Respondenci znają zasady ergonomii i wyrażają chęć pogłębienia swojej wiedzy na ten temat. Wiedzę tę należy uzupełnić o podstawowe wiadomości z zakresu aktywnej fizjoterapii i neurofizjologii ze względu na rolę czynników psychologicznych w leczeniu przewlekłego bólu.

SŁOWA KLUCZOWE

ból kręgosłupa, pielęgniarki, ergonomia, nadwaga, Podkarpacie

INTRODUCTION

Acute, short-term pain is a beneficial phenomenon as it warns that pathological processes are taking place in an organ, but chronic pain lasting months or years has many negative consequences [1]. The feeling of pain is generated within the receptors as a result of the action of nociceptive stimuli. In damaged tissues, kinins, prostaglandins and pro-inflammatory cytokines – interleukin 1 (IL 1), IL 6, tumor necrosis factor (TNF) – generate impulses in pain receptors, and then two systems of afferent fibres (A delta and C fibres) conduct the sensation of pain to the posterior horns of the spinal cord, then to the brain stem and the sensory cortex. At all these stages, the flow of these impulses is modulated, channelled and inhibited. The brain cortex, where there is an integration of impulses coming from receptors and simultaneously activated centres related to emotions and from the brain's motivational systems, plays the greatest role in the perception of pain. The following are involved in the transmission of pain impulses: glutamates, aspartates, P substance, gamma aminobutyric acid (GABA) and opioids. Fibres descending from the cerebral cortex, the grey matter and the medulla that secrete serotonin, noradrenaline and opioids play a significant role in inhibiting pain at the level of the posterior horns of the spinal cord. As a result of chronic pain, the spinal cord remodels: new synaptic connections are formed, glial cells multiply, sensitization phenomena occur [2]. The broad representation of neurons in the central nervous system (CNS) involved in the perception of pain is influenced by hormones, immunity, as well as mental and physical stress. Chronic pain triggers negative emotions: irritation, anger, anxiety, and depression. The perception of pain depends on the personality of a man; it is strictly personalized and in its background there is upbringing, education, social position and interpersonal relations in the workplace [1].

Back pain syndromes accompany nurses and related medical professions all over the world [3,4,5,6,7,8]. Back pain is a type of chronic pain felt along the axis of the body, most often on the dorsal side. It is a consequence of long-term disorders and changes in the spine, peripheral joints and soft tissues. A significant part of the professional activities of a nurse is manual work related to lifting and carrying patients and medical equipment without additional devices. Other activities include feeding patients, administering medications, the toilet of patients, which is often performed on poorly adjusted beds that require spine movements in many planes, and in a forced position of the body at the same time [3,4, 8,9,10]. Increasingly more authors point out that pain depends not only on body posture, hard physical work, obesity and lack of exercise, but to a large extent on personality and social conditions, and these factors may dominate physical conditions [4,5,7,8,9,11,12, 13,14]. The employees of hospices, care and treatment facilities and nursing homes face even greater problems.

Back pain syndromes constitute a serious health problem. They often affect people between 40 and 60 years of age but they are sometimes common before the age of 30. Currently, it is ever more difficult to motivate individuals to be physically active in order to prevent overloading of the spine and perivertebral tissues [3,14,15,16,17]. A sedentary lifestyle, improper nutrition leading to overweight and obesity, the widespread use of stimulants and overuse of painkillers – these factors contribute directly to spine ailments.

The aim of the study was to analyze the occurrence of risk factors for back pain syndromes among nurses and to determine the methods of prevention used in a group of professionally active nurses.

MATERIAL AND METHODS

The study was conducted in February and March 2019 in the departments of two poviat hospitals in the Podkarpackie Voivodship. In total, 102 people of both sexes were examined: 97 female nurses and 5 male nurses. In the first stage, a questionnaire survey was performed, for which a questionnaire was used containing 32 open and closed questions – Appendix 1 and 2. They concerned age and the appearance of pain syndromes, working time and conditions, the principles of ergonomics and pro-health measures. In the second stage, anthropometric measurements (height, weight) were performed and body mass index (BMI) was calculated.

The survey questions concerned the respondents' working conditions, their awareness of ergonomic principles, and pro-health behavior at the workplace. Sensitive diagnostic tests were carried out, i.e. the Lasègue test, PP (Tomayer) test, Schober test and cervical and lumbosacral mobility test.

The research methods that were used in the conducted study included a diagnostic survey and cross-sectional physiotherapeutic studies. Research techniques are specific activities that make it possible to obtain information by selecting an appropriate method. The survey technique and measurements were used. The research tools for this work were the questionnaire (Appendix 1) and the physiotherapeutic examination card (Appendix 2). The survey questions were closed and open, they were clearly defined and did not pose the respondents difficulties; therefore the answers should be considered reliable, but in the assessment they are treated as subjective. The survey contained 32 questions, from which a great deal of information was obtained, which will be presented in the results. Research tools are also items used to implement a given technique, and in this work the tools were a tailor's tape measure, bathroom scale, paper research card, paper questionnaire, pen, and the hands of a physiotherapist.

Statistical analysis was performed using IBM SPSS 20 and Microsoft Excel. If both features were of a nominal nature, the significance of differences between them was assessed using the Chi-square test of independence. The significance of differences between the compared groups was assessed by means of the Mann-Whitney U test and the Kruskal-Wallis test at $p < 0.05$. The analysis of the relationship between the two numerical features was performed with Spearman's rank correlation coefficient (R).

RESULTS

The study group was dominated by women – 97 (95.1%); there were only 5 men (4.9%), and due to such a small number, they were not distinguished as a separate subgroup of the respondents. The age distribution was highly diversified: the youngest person was 21 years old and the oldest was 63 years old. The median age was 48 years. Figure 1 presents the age distribution of the study group.

Table I shows the BMI values of the respondents. It is clearly visible that overweight and obesity occur in 50 of the surveyed people, which constitutes 50% of the group.

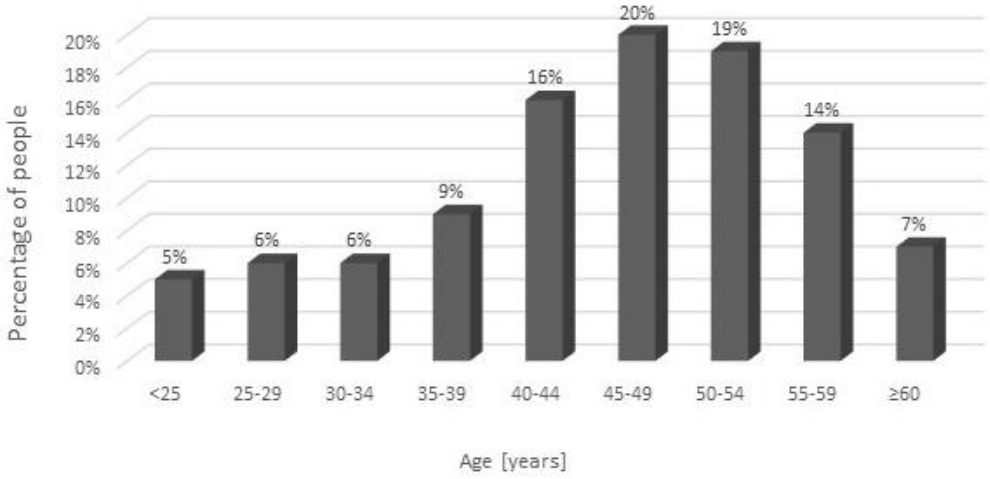

Fig. 1. Age distribution of respondents.
Ryc. 1. Rozkład wieku badanych.

Table I. BMI according to WHO standards in studied group
Tabela I. Wartości BMI według WHO w badanej populacji

Classification by BMI	Number of respondents (%)
Underweight	1 (1.0%)
Norm	51 (50.0%)
Overweight	40 (39.2%)
Obese	10 (9.8%)

BMI – body mass index, WHO – World Health Organization

Almost 60% are people without addictions, but as many as a third of the respondents smoke cigarettes, as shown in Table II.

Table II. Stimulants used by respondents
Tabela II. Stosowanie używek przez badanych

Substances used	Number of respondents (%)
Tobacco	31 (30.4%)
Alcohol	10 (9.8%)
No substances	61 (59.8%)

The level of physical activity in nurses can be considered unsatisfactory. Over 40% of the nurses declare that they do not do any physical activity, one third of the respondents indicate only walking as their daily activity (Table III).

Back pain occurred in the vast majority of the subjects – 90 people (89.2%). The respondents considered physical effort as the main cause of pain, especially lifting heavy loads – 59 people (57.8%), followed by a forced static body position – 28 people (27.5%). Mental stress was reported by 13 people (12.7%) and only 12 people (11.8%) had no pain (Table IV).

In the study group, only 39 people (38.2%) underwent training in ergonomics at the workplace, despite this, 71 respondents (69%) knew the rules of lifting loads (Fig. 2). Most of the respondents have reservations as to the conditions of work – only 15% of the respondents consider them comfortable.

Table III. Physical activity of respondents
Tabela III. Aktywność fizyczna badanych

Physical activity	Number of respondents (%)[1]
Walking	32 (31.4%)
Cycling	16 (15.7%)
Running	13 (12.7%)
Swimming	10 (9.8%)
Gymnastics	10 (9.8%)
No physical activity	43 (42.2%)

[1] Sum does not equal 100% because respondents could indicate any number of answer variants.

Table IV. Occurrence and causes of back pain according to respondents
Tabela IV. Występowanie i przyczyny bólu pleców według badanych

Causes of back pain	Number of respondents (%)[1]
Lifting heavy loads or exercising	59 (57.8%)
Forced static position at work	28 (27.5%)
Sitting for many hours	18 (17.6%)
Mental stress	13 (12.7%)
Physical exercise, playing sports	4 (3.9%)
Other	3 (2.9%)
No back pain	12 (11.8%)

[1] Sum does not equal 100% because respondents could indicate any number of answer variants.

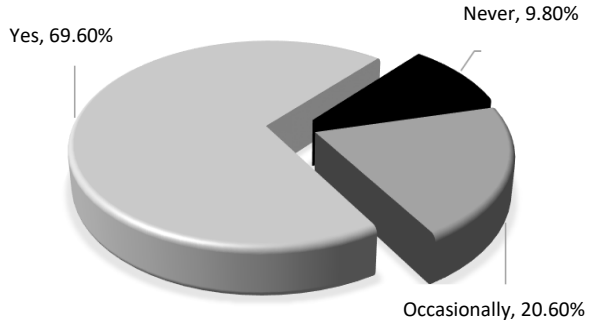

Fig. 2. Percentage of respondents following of rules of lifting loads at work.
Ryc. 2. Przestrzeganie zasad podnoszenia ciężarów w pracy.

The correct position of the body while performing activities at the workplace is observed by only 23 people (22.5%), who maintained this position when caring for patients (Table V). The overwhelming majority do not follow these rules or apply them sporadically.

Table V. Observation of correct body positions at work – self-assessment of respondents
Tabela V. Dbanie o prawidłowe pozycje w pracy – samoocena respondentów

Correct body positions	Number of respondents (%)
Always	23 (22.5%)
Sometimes	63 (61.8%)
I do not observe them	12 (11.8%)
Never	4 (3.9%)

Almost 60% of the respondents use painkillers without going to a doctor or physiotherapist if any ailments occur. Figure 3 shows percentages that do not equal one hundred because it was possible to indicate any number of answer variants.

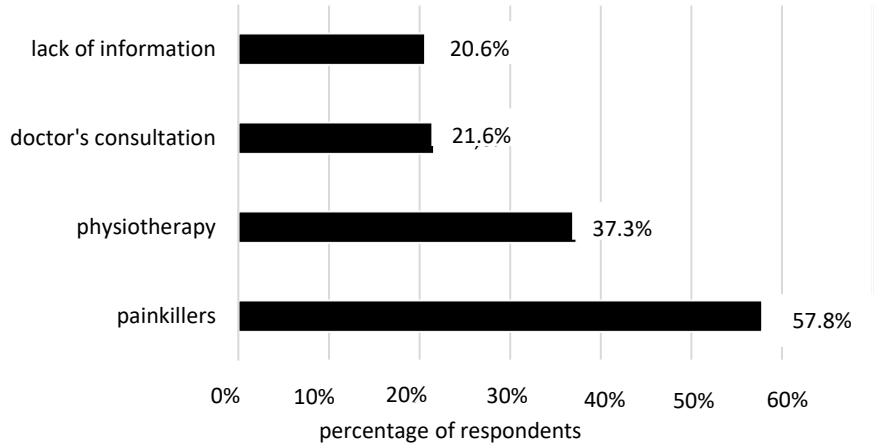

Fig. 3. Taking actions if pain occurs.
Ryc. 3. Działania podejmowane w przypadku wystąpienia bólu.

DISCUSSION

As noted in the introduction to the article, back pain accompanies nurses all over the world and is the subject of research by many authors, also in Poland [3,4,5, 6,7,8,14,18,19]. However, such research has not been conducted in this group of respondents, which included nurses from two poviat hospitals in the Podkarpackie Voivodship. It consisted of 102 people: 97 female nurses and 5 male nurses. The age distribution of the respondents was significant and ranged from 21 to 63 years old, and more than half of the respondents were 48 years old. Back pain syndromes concern both men and women; nevertheless, due to the small number of men in this group (n = 5), they were not separated from the sample. Other people working in medical professions such as physiotherapists and paramedics also suffer from back pain syndromes. Taking into account absenteeism, it can be concluded that back pain syndrome in these professions should be considered an occupational disease [3,10,15,20]. In this group of respondents, back pain occurs in as many as 89.2% of the subjects.

The research also shows that nurses have knowledge of the risk factors for pain syndromes. Among the respondents, 57.8% of the people know and are able to indicate the factors causing overload of the spinal column, i.e. lifting heavy loads or strenuous physical effort. Another factor mentioned by nurses that caused back pain was the forced position at work, which was declared by 27.5% of the respondents. These results are confirmed by the results of other studies, which emphasize that back pain is the result of overstrain, a forced body position and prolonged sitting [3,5,6, 15,18,21]. They most often appear in middle age, which was confirmed in the group of studied nurses.

Among the respondents, as many as 50% were overweight or obese, which is important. 42.2% of the respondents declared that they do not do any physical activity outside of work despite the fact that almost half of them live in the countryside, where there are favourable conditions for exercise.

The hospital wards where the research was conducted did not have ergonomic equipment that would prevent the nurses from taking a forced posture and lifting patients. It is important to adjust the patient's bed and use lifting devices to lift the equipment and patients [4,6,14,22]. The length of service was of no importance in applying these principles in hospitals. Nearly two--thirds of the respondents (68.6%) would like to broaden their knowledge of the prevention of back pain. Research conducted in many centres where the Spine Care for Nurses program was applied, using safe patient handling techniques, active physiotherapy (a set of exercises – Back School) and health education, has shown that the program contributed to a reduction in pain [11,13,20,23,24]. It can be concluded that professional medical help (physiotherapy and medical visits), instead of painkillers, would improve the health of the respondents.

As metioned in the introduction, the perception of pain has a multi-component nature in which the human psyche plays an active role. This is confirmed by the research on back pain carried out on nurses in other centres [5,12,25]. Those studies highlight the multifactorial cause of these ailments: stress, social factors, mental stress, and interpersonal relationships at work [7,8,12,26]. Frequent inspections, reports, lack of social acceptance and poor remuneration contribute to mental stress and the perpetuation of pain symptoms [26]. In our study, only 13% of the respondents indicated stress as the cause of pain; it should be assumed that for the majority of the respondents (87%), working with patients brings satisfaction, and the interpersonal relations in the departments in these hospitals are good; similar results were obtained in Japan [4]. The results we have obtained as well as the

type of research conducted, should be interpreted carefully. In 2004, Menzel [13] assessed this type of research performed in a number of centres. In this assessment, attention was drawn to the inconsistency of methods, and the lack of standardization of the performed tests.

CONCLUSIONS

1. Back pain occurs in 90% of the surveyed nurses in hospitals in the Podkarpackie Voivodship and has the features of an occupational disease.
2. The respondents indicate that a forced posture, lifting heavy loads and the lack of ergonomic equipment are the main causes of these ailments.
3. Additional factors stressing the spine are obesity and the lack of physical activity. Mental factors have little effect on this disease.
4. The respondents know the principles of ergonomics and express their willingness to deepen their knowledge on this subject. This knowledge should be supplemented with basic understanding of active physiotherapy and neurophysiology due to the role of psychological factors in the treatment of chronic pain.

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Author's contribution

Study design – E. Oliwko, M. Babuśka-Roczniak, W. Roczniak
Data collection – E. Oliwko, W. Roczniak
Data interpretation – E. Oliwko, B. Brodziak-Dopierała, W. Widuchowski, W. Roczniak
Statistical analysis – E. Oliwko, B. Brodziak-Dopierała, W. Roczniak
Manuscript preparation – E. Oliwko, B. Brodziak-Dopierała, W. Roczniak
Literature research – E. Oliwko, M. Babuśka-Roczniak, W. Widuchowski, W. Roczniak

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Appendix 1

QUESTIONNAIRE

Mark your answer with an X:

1. Sex:
   - ☐ woman
   - ☐ man
2. Height …… cm
3. Weight …… kg
4. Age:
   - ☐ 20 to 29 years old
   - ☐ 30 to 39 years old
   - ☐ 40 to 49 years old
   - ☐ 50 to 59 years old
   - ☐ over 60 years of age
5. Education:
   - ☐ secondary
   - ☐ higher
6. Place of residence:
   - ☐ countryside
   - ☐ city
7. When did the first back pains occur?
   - ☐ I have never suffered back pain
   - ☐ up to 5 years ago
   - ☐ 5 to 10 years ago
   - ☐ 10 to 15 years ago
   - ☐ they are persistent and surely have lasted for over 15 years
8. Your length of service in the nursing profession is:
   - ☐ up to 5 years
   - ☐ up to 10 years
   - ☐ up to 15 years
   - ☐ up to 20 years
   - ☐ 25 years and above
9. Are you chronically ill?
   - ☐ yes – answer the question below
   - ☐ no – go to Question 10

   If so they are the symptoms of:
   - ☐ the locomotor system
   - ☐ the circulatory system
   - ☐ the respiratory system
   - ☐ the nervous system
   - ☐ other, please specify ……
10. How many hours a week do you work?
    - ☐ 10–20 hours
    - ☐ 20–40 hours
    - ☐ 40–60 hours
    - ☐ more than 60 hours
11. You consider your job to be:
    - ☐ very stressful, I feel mentally and physically exhausted
    - ☐ it is demanding, tiring physically and mentally
    - ☐ tiring/I occasionally feel tired
    - ☐ it is not stressful or exhausting, I do not feel tired
12. Do you use stimulants?
    - ☐ cigarettes
    - ☐ alcohol
    - ☐ psychoactive substances
13. Have you ever followed a diet?
    - ☐ yes, for the purpose of ……
    - ☐ no

14. Do you have a visual impairment requiring corrective eyewear?
    - ☐ yes
    - ☐ no
15. When it comes to being susceptible to stress:
    - ☐ I am very resistant
    - ☐ I am good at dealing with stress
    - ☐ there are situations in my private and professional life where I cannot cope
    - ☐ I am a person who is not immune to stress
16. Do you have a postural defect?
    - ☐ I don't
    - ☐ yes, I have .....
17. Indicate how often you feel discomfort due to back pain:
    - ☐ my spine never hurts
    - ☐ once a year
    - ☐ regularly every few months
    - ☐ every day
18. When your spine hurts then it concerns:
    - ☐ the cervical part
    - ☐ the thoracic part
    - ☐ the lumbar part
    - ☐ more than one section
19. Mark the pain intensity level on the axis, where 0 – no pain and 10 – maximum pain

20. Have you had any spinal surgeries?
    - ☐ yes, it was .....
    - ☐ no
21. Have you had spine diagnostics due to your ailments?
    - ☐ yes
    - ☐ no
22. If you have a backache, please indicate what you think the cause may be:
    - ☐ long-term sitting
    - ☐ lifting heavy loads or engaging in strenuous physical exertion
    - ☐ physical exercise, playing sports
    - ☐ mental stress
    - ☐ static forced position at work
    - ☐ other answer .....
    - ☐ I don't know
23. What kind of activity do you do for at least 30–45 minutes a day:
    - ☐ I don't do any exercise
    - ☐ I take regular walks
    - ☐ I run
    - ☐ I swim
    - ☐ I ride a bicycle
    - ☐ I do gymnastics
    - ☐ other answer .....
24. If it happened that your spine hurt:
    - ☐ I did nothing, waited for the symptoms to disappear
    - ☐ I took painkillers
    - ☐ I had physical therapy
    - ☐ I visited a doctor for this reason
25. Are you interested in spine pain prevention?
    - ☐ yes
    - ☐ no
26. Do you know the principles of work ergonomics at your workplace?
    - ☐ yes and I always follow the rules
    - ☐ it happens that I follow them, but I do not pay much attention to it
    - ☐ I haven't read the rules and I don't comply

27. Is your workplace suited to performing your job in healthy and safe conditions?
    - ☐ yes, I find it comfortable
    - ☐ not exactly the patient's bed and the computer are not the right height, working with them often forces me to assume forced positions
    - ☐ not suited, I don't work well
    - ☐ I don't know
28. Is there any training in work ergonomics in your workplace?
    - ☐ yes
    - ☐ no
29. Have you read the standards for lifting loads for women and men in the workplace?
    - ☐ yes, they are known to me
    - ☐ I used to talk / talk to my friends about them, but I don't remember much
    - ☐ I never got acquainted with them
30. Do you remember about correct body positions when performing everyday activities in order not to strain your spine?
    - ☐ I always observe them
    - ☐ it happens sometimes
    - ☐ I do not observe to them at all
    - ☐ I do not apply them
31. Do you pay attention to the fact that the equipment that you use every day at home has the appropriate ergonomic shapes and appropriate lengths to prevent the assumption of forced positions?
    - ☐ yes
    - ☐ no
32. Do you remember to do full body stretching in bed after waking up every day?
    - ☐ yes, I stretch like a cat every day
    - ☐ it happens rather on weekends when I have more time to rest
    - ☐ never, I just get up and start another day of my life

Appendix 2

PHYSIOTHERAPY RESEARCH CARD
EXAMINATION OF THE SPINE

1. Date: ……
2. Sex: ……
3. Age: ……
4. Height: ……
5. Body weight: ……
6. BMI indicator: ……
   - ☐ underweight
   - ☐ normal
   - ☐ overweight
   - ☐ obese
7. Mobility of the cervical spine:
   - ☐ flexion – 0 – extension ……
   - ☐ bend right – 0 – bend left ……
   - ☐ rotation right – 0 – rotation left ……
8. Mobility of the lumbosacral spine:
   - ☐ Schober test Z – 0 – W ……
   - ☐ PP test (fingers – floor) ……
9. Lasègue test of the lumbosacral section:
   - ☐ positive
   - ☐ negative