

# Back pain in a group of professionally active nurses from the Bielsko-Biała Poviát - preliminary report

( Dolegliwości bólowe kręgosłupa w grupie aktywnych zawodowo pielęgniarek powiatu bielskiego – doniesienie wstępne )

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**Abstract** – Introduction. The professional group of nurses is exposed to the occurrence of back pain due to the action of mechanical factors exceeding physical endurance and the formation of long-term degenerative changes.

The aim of the study. Assessment of the occurrence of the problem of back pain in professionally active nurses.

Materials and methods. The study was conducted in a group of 110 professionally active nurses working in the tertiary hospitals in Bielsko-Biała. The research tool was the author's questionnaire.

Results. The study showed that the incidence of pain in professionally active nurses is 97.3%. The highest percentage of nurses surveyed experienced back pain in the lumbar region (73.6%), 41.8% in the cervical segment, and 33.6% in the thoracic segment. Along with seniority, the pain increased. The main factors increasing the severity of pain in the opinion of the respondents were lifting / moving patients and taking an inclined position.

Conclusions. Back pain is one of the most serious problems in the professional nurses group. Most of the nurses participating in the study do not have proper knowledge about work ergonomics, activities supporting the musculoskeletal system and non-pharmacological relief of pain.

**Key words** - nurse, back pain, work ergonomics.

**Streszczenie** –Wstęp. Grupa zawodowa pielęgniarek jest narażona na występowanie dolegliwości bólowych kręgosłupa z powodu działania czynników mechanicznych przekraczających wytrzymałość fizyczną i powstawanie długotrwałych zmian zwyrodnieniowych.

Cel pracy. Ocena występowania problemu dolegliwości bólowych kręgosłupa u aktywnych zawodowo pielęgniarek. Materiały i metody. Badania przeprowadzono w grupie 110 pielęgniarek aktywnych zawodowo pracujących w szpitalach powiatu bielskiego. Narzędziem badawczym był autorski kwestionariusz ankiety.

Wyniki. Przeprowadzone badania wykazały, że częstość występowania dolegliwości bólowych u pielęgniarek aktywnych zawodowo wynosi 97,3%. Największy odsetek badanych pielęgniarek odczuwał dolegliwości bólowe kręgosłupa w odcinku lędźwiowym (73,6%), 41,8% w odcinku szyjnym, a 33,6% w odcinku piersiowym. Wraz ze stażem pracy dolegli

wości bólowe nasilały się. Głównymi czynnikami zwiększającymi nasilenie się bólu w opinii badanych było podnoszenie/przemieszczanie pacjentów oraz przyjmowanie pozycji pochylonej.

Wnioski. Dolegliwości bólowe kręgosłupa są jednym z najpoważniejszych problemów w grupie zawodowej pielęgniarek. Większość pielęgniarek biorących udział w badaniu nie posiada właściwej wiedzy na temat ergonomii pracy, działań wspierających układ mięśniowo-szkieletowy oraz nefarmakologicznego łagodzenia dolegliwości bólowych.

**Słowa kluczowe** – pielęgniarka, dolegliwości bólowe kręgosłupa, ergonomia pracy.

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- A. The idea and the planning of the study
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- C. The data analysis and interpretation
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## I. INTRODUCTION

Spinal pain syndromes are a significant social and economic problem. Reports indicate that they may affect up to 90% of the population [1]. Musculoskeletal disorders are the result of many years of work environment impact, factors related to non-occupational activity and individual characteristics, such as age, gender, body composition, physical fitness, and susceptibility to stress [2]. The occupational group most exposed to overload of the musculoskeletal system is nurses [3]. The work of nursing staff is related to numerous factors that, as a consequence, can lead to overload and chronic pain of the locomotor system. Risk factors include physical factors associated with shift work, monotone effort, often requiring the maintenance of a forced position, lifting patients and medical equipment, and mental factors resulting from enormous responsibility for the health and life of patients / clients [4]. The subject literature has been dealing with the problem of musculoskeletal disorders reported by nursing staff for many years. The need for diagnostics and implementation of preventive measures has been emphasized many times [5-7]. Despite this, the problems of back pain in the professional nurses group are increasing. It is estimated that currently over 95% of Polish nurses complain of lower back pain [2].

The aim of the study was to assess the incidence of back pain, their nature and to learn about risk factors for their occurrence in the group of professionally active nurses.

## II. MATERIALS AND METHODS

The study was conducted in a group of 110 nurses working in the tertiary hospitals in Bielsko-Biała Poviát. The criterion for inclusion in the study was: work as a nurse and consent to participate in the study. 175 questionnaires were distributed among nursing staff, of which 110 were received back. Return was 63%. The study involved nurses from the following departments: Neurology, Neonatology, Cardiology, Radiotherapy and Chemotherapy, Oncology, General and Oncological Surgery, Operating Theater, Anesthesiology and Intensive Care, Nursing and Therapy Center, Palliative Care and Gastroenterology. The research was carried out from June 2018 to March 2019. The approval of the Directorate was obtained for the tests. The method of diagnostic survey was used in the study, the research technique was a survey, the research tool was the author's survey questionnaire, which contained 41 ques-

tions about the main problem of research. The first part of the questionnaire included questions about socio-demographic variables: gender, age, education, seniority, and social and living conditions. The second part included questions about the state of health of the respondents and ergonomics at work. Whereas the third part contained questions about the occurrence of pain and the intensity of pain occurring in the respondents. Based on the body weight and height – data provided by the respondents, the Body Mass Index (BMI) was determined. According to the guidelines of the World Health Organization, the following division was adopted: BMI <18.50 kg / m<sup>2</sup> - underweight, BMI 18.50 - 24.99 kg / m<sup>2</sup> - normal, BMI 25.00 - 29.99 kg / m<sup>2</sup> - overweight, BMI > 30.00 kg / m<sup>2</sup> - obesity.

The test results were statistically analyzed using the Statistica version 13.0 statistical package and the Excel 2016 spreadsheet. The variables measured on the quantitative scale were characterized by, among others the arithmetic mean and standard deviation, while the variables of the qualitative type that were measured on the nominal scale were presented by means of cardinality and percentage values (percentage). The significance of differences between the two groups was examined by the Mann-Whitney U test of significance. The relationship between two variables on the ordinal scale was examined using the Spearman rank correlation coefficient. The relationship between two variables measured on the nominal scale (independent variables) was examined using the chi-square test / chi-square test with Yates correction / Fisher's exact test. In all calculations, the level of significance was  $p < 0.05$ .

## III. RESULTS

Women constituted the vast majority of respondents (98.2%). Over 30% of respondents (35.5%) were people aged 22-30. There were 28.2% of respondents over the age of 50. Most people in the study group graduated from medical high school (41.8%). Higher vocational education was declared by 34.6% of respondents. Most respondents (25.5%) had seniority over 30 years, every fifth person had worked for 1-5 years, and 14.5% had worked for 11-15 years. Nurses with a normal BMI (69.1%) constituted the highest percentage among the respondents, however 30% of the respondents were abnormal, including 10% obese (Table 1).

Table 1. Size distribution of the research sample

Imprint		Altogether		Education			
				Medical high school/ medical school		Higher bachelor/ master	
				n	%	n	%
Sex	Women	108	98,2	56	98,2	52	98,1
	Men	2	1,8	1	1,8	1	1,9
Age [years]	22-30	39	35,5	14	24,6	25	47,2
	31-40	16	14,5	2	3,5	14	26,4
	41-50	24	21,8	14	24,6	10	18,9
	>50	31	28,2	27	47,4	4	7,5
Education	Medical High school	46	41,8	46	80,7	-	-
	Medical school	11	10,0	11	19,3	-	-
	Bachelor degree	38	34,6	-	-	38	71,7
	Master degree	15	13,6	-	-	15	28,3
Seniority [years]	1 – 5	23	20,9	4	7,0	19	35,8
	6 – 10	14	12,7	0	0,0	14	26,4
	11 – 15	16	14,5	11	19,3	5	9,4
	16 – 20	6	5,5	3	5,3	3	5,7
	21 – 25	15	13,6	9	15,8	6	11,3
	25 – 30	8	7,3	6	10,5	2	3,8
	> 30	28	25,5	24	42,1	4	7,5
BMI	Underweight	1	0,9	1	1,8	0	0,0
	Normal	76	69,1	33	57,9	43	81,1
	Overweight	22	20,0	14	24,6	8	15,1
	Obesity	11	10,0	9	15,8	2	3,8

85.5% of respondents declared work as a section nurse practitioner. 10% of the respondents performed the function of a procedure nurse, and 4.5% of the respondents held the position of ward nurse. Nurses working in a 12-hour shift system constituted the largest percentage (91.8%). 96.4% of respondents had direct contact with the patient. Most respondents (79.1%) declared that full-time hospital work was their only place of work. Statistical analysis did not reveal any significant relationships between full-time employment and education, age, BMI, and seniority ( $p > 0.05$ ). The most common activities in the ward carried out by the surveyed nurses were: bending (65.4%), lifting / moving the patient (59.1%), long standing position during on-call time (43.6%), crouching (25.4%), sitting for a long time (15.4%) and moving heavy equipment (12.7%). Of the respondents, only 16.4% rated their working conditions as very good. Half (48.2%) of the respondents rated them as good, 32.7% of the respondents - as average. Three people said they were working in bad conditions. Statistical analysis did not show statistically significant differences in the level of assessment of working conditions due to education, BMI, age and seniority ( $p > 0.05$ ). 47.5% of nurses answered that the work intensity is at an average level, and as many as 43.4% described them as overwhelming. The vast majority of respondents (88.2%) said that the work they performed had

an impact on their current state of health. Among the comorbidities reported by the subjects, cardiovascular disease accounted for the largest percentage (63.6%). Of the respondents, 5 (22.7%) had diabetes and 3 (13.6%) had rheumatism. Over 95% of the surveyed nurses (97.3%) declared the occurrence of back pain, while slightly more than half (50.9%) gave an affirmative answer to the question about the treatment of these ailments. Over half of the respondents (55.4%) were diagnosed with back pain. 54.6% of respondents said that back pain was interfering with their work. Almost 45% of respondents (44.5%) answered that back pain sometimes interferes with the performance of professional duties. Almost 70% of respondents aged 22-30 (69.2%) were not treated for back pain, while 65% for 31-50 years and 58.1% of those aged over 50 were treated for back pain. Considering the occurrence of pain and the age of respondents, statistically significant correlations between treatment due to back pain and age were demonstrated ( $p = 0.0063$ ).

Analysis of responses regarding the treatment of back pain and BMI showed that 55.3% of subjects with normal body weight were not treated for back pain, while 66.7% of subjects with overweight and obesity undertook therapy in connection with back pain, which was a statistically significant difference ( $p = 0.0353$ ).

Taking into account seniority and treatment due to pain, it was shown that the increase in seniority increased the percentage of nurses undertaking treatment ( $p = 0.0104$ ). In the group of respondents with seniority up to 15 years, 62.3% did not receive treatment because of backache, while 72.4% of the respondents working 16-30 years and 53.6% of those with work experience over 30 years were treated because of backache.

Of the respondents, 31.8% reported the occurrence of back pain every day, 32.8% once a week, 26.4% several times a month. 4.5% of respondents complained of pain occurring once every six months or less.

The most numerous group of respondents were people who determined the duration of pain for one day (39.1%). Every third respondent experienced pain lasting from two to five days, 14% complained of ailments lasting more than a week, 6% one week, 4% month, 2% - half year, 3% - a year. Most nurses showed a significant relationship between age ( $p = 0.0054$ ), seniority ( $p = 0.0376$ ) and the frequency of back pain.

The highest percentage of respondents (73.6%) experienced back pain in the lumbar spine, 41.8% in the cervical spine, and 33.6% in the thoracic spine. Considering the study group in terms of age and location of pain, it was noticed that these differences were not statistically significant ( $p > 0.05$ ). Every third respondent described the nature

of pain as transient, 31.8% as radiating, 23.6% as permanent pain, and slightly more than 15% (16.4%) as point pain. Given the nature of the pain and its location, it was found that the largest percentage of respondents reported the occurrence of permanent pain occurring in the cervical (57.7%) and thoracic (61.5%), while pain of a different nature was most often located in the lumbar spine (78.6%). A statistically significant relationship was demonstrated between the nature of the pain and the spine segment ( $p < 0.05$ ).

Over 35% of respondents said that pain was accompanied by numbness (37.7%) and tingling (23.6%). Among other accompanying symptoms, the respondents indicated stiffness (21.8%), muscle weakness (20%), and noise and dizziness (22.7%). A higher percentage of subjects with overweight and obesity than with normal body weight stated that back pain was accompanied by numbness (54.6%), tingling (51.5%) and weakness of muscle strength (33.3%). A significant statistical relationship was demonstrated between accompanying symptoms and BMI ( $p < 0.05$ ) (Table 2).

Table 2. Relationship between BMI and ailments associated with back pain

N=109	BMI				Statistics value	P
	Normal weight		Overweight and obesity			
	n	%	n	%		
Numbness	23	30,3	18	54,6	5,782	0,0162*
Tingling	9	11,8	17	51,5	17,814	0,0000**
Radiating pain	39	51,3	22	66,7	2,200	0,1380*
Dull pain	34	44,7	11	33,3	1,234	0,2666*
Stiffness	13	17,1	11	33,3	3,529	0,0603*
Muscle weakness	10	13,2	11	33,3	6,021	0,0141*
Noise and dizziness	15	19,7	10	30,3	1,453	0,2280*

Legend: n-number of people in the sample;% - percentage; p-level of significance; \* chi-square test; \*\* chi-square test with Yates' correction

Almost half of the studied group of nurses (46.2%) experienced numbness during the patient's lifting and movement, which was a significant relationship ( $p = 0.0206$ ). In addition, statistical analysis showed a statistically significant relationship between heavy equipment movement and tingling ( $p = 0.0203$ ), stiffness ( $p = 0.0123$ ), muscle weakness ( $p = 0.0069$ ) as symptoms associated with back pain.

The largest percentage of respondents (45.5%) experienced significant pain after physical activity, including lifting the patient. Pain in the spine interfered with regular household chores 38% of respondents, 35% disturbed night rest (Table 3).

Table 3. Distribution of the research group by intensity, place and nature of pain

		Number	Percentage (%)
When do you have pain most often?	Morning	5	4,5
	Evening	17	15,5
	After physical activity (lifting the patient)	50	45,5
	During the day	25	22,7
	Hard to say	13	11,8
Please tick the answers regarding your ailments	I often change my position to relieve my back	70	63,6
	Due to lower back pain, I walk more slowly than usual	7	6,4
	Back pain bothers me in doing normal housework	42	38,2
	Because of back pain, I always have to hold on to the handrail when climbing up	2	1,8
	Because of back pain, I often lie down to rest	17	15,4
	I am often on sick leave because of back pain	6	5,4
	Because of back pain, I am careful not to have to stand up for too long	27	24,5
	Due to back pain, I am careful to bend as little as possible and/or kneel	34	30,9
	Pain in the spine makes it difficult for me to turn in bed	17	15,4
	Spine pain does not allow me to go on longer routes	16	14,5
	My backache is disturbing my sleep	39	35,4
	I spend most of my time in a sitting position due to back pain	8	7,3
	I am more capricious and irritable because of back pain	14	12,7
I spend most of my time in bed because of my back pain	10	9,1	

Most respondents (60%) reported that they use painkillers to relieve pain. Adopting a convenient position was indicated by 47% of the respondents, and the other respondents additionally mentioned: walking (24%), rehabilitation (25%) and muscle strengthening exercises (24%).

Over half of the respondents complained about the lack of height adjustment of the bed (64.5%), limited access to the patient's bed (52.7%), as well as the lack of specialized equipment (26.4%). With age, the percentage of respondents who believed that the greatest difficulty at work was the lack of specialized equipment. This percentage was most visible among people over 50 (45.2%), which in relation to other age categories was a statistically significant difference ( $p = 0.0152$ ). Along with the increase in seniority, the percentage of respondents who believed that the greatest difficulty at work is the lack of specialized equipment ( $p = 0.0200$ ). In the opinion of the surveyed nurses with seniority over 30 years, the most common difficulties encountered at work are: lack of bed height adjustment (78.6%), limited access to the patient's bed (46.4%), difficulties in moving the patient (28.6%), inappropriate chairs at nursing centers (21.4%), moving heavy equipment (14.3%), narrow door in the corridor (7.1%).

In the opinion of 78.2% of the nurses, the increase in back pain was supporting, leaning (60.9%), standing (40.9%). Statistical analysis showed a statistically significant relationship between age and leaning. With age, the percentage of respondents who in the ward performing the bending function experienced an increase in back pain increased. In the group of examined nurses aged 22-30, this percentage was 46.2%, aged 31-50 65%, while over 50 years old 74.2%, which was a statistically significant difference ( $p < 0.05$ ). Statistical analysis showed a statistically significant relationship between BMI and leaning. In a larger percentage of subjects with overweight and obesity (84.8%) compared to respondents with normal body weight (50%), the bending function performed increased back pain, which was a statistically significant difference ( $p < 0.05$ ). Statistical analysis showed statistically significant differences in the level of severity of back pain in the lumbar spine after night shift - a higher level of severity of pain in the lumbar spine after night shift was declared by people who are overweight and obese than with normal body weight ( $p = 0.0273$ ).

83.6% of surveyed group stated that they adhere to the principles of ergonomics, 87.3% of respondents said they knew the permissible weight of lifting and carrying, with only 41.2% providing the correct value.

#### IV. DISCUSSION

Nursing is in the top ten professions exposed to musculoskeletal overload [8]. In the last decade, there have been many publications on back pain in the profession of nursing staff, thus confirming the seriousness of the problem [2,3,9-14]. This is confirmed by the results of own research, in which over 95% of nurses declared the occurrence of back pain, of which 88.2% of respondents claimed that the current state of health is influenced by their professional work. The examples cited above show that the problem of back pain syndromes is serious and concerns nurses not only in Poland but also in the world. It is worth analyzing its causes and possible ways of reducing it. The occurrence of back pain syndromes is associated with a number of factors and hazards related to workload, which is defined as "the degree to which a person is involved in performing one or more tasks or the effects of this involvement on his body" [15,16]. Therefore, the conditions in which nurses work have a significant impact on the appearance of back pain. In the own study only 16.4% rated their working conditions as very good. Half (48.2%) of the respondents rated them as good, 32.7% of the respondents

- as average. Three people said they were working in bad conditions. 47.5% of nurses answered that the work intensity is at an average level, and as many as 43.4% described them as overwhelming. Adamaszek and Włoszczak-Szubda pay attention to the nurse's work in direct contact with the patient exerting pressure on mental and physical loads, i.e. lifting, frequent bending down, remaining in a forced position for a longer period of time [3]. Maciuk et al. also believe that the leaning position and lifting are the most burdensome for a nurse [2]. It is worth emphasizing that nurses take an inclined position while performing nursing, hygiene, care and treatment, diagnostic and treatment activities usually at the patient's bed, and the time and number of repetitions depend on the patient's health and the specificity of the ward [2]. Our study showed that difficulties encountered at work that could exacerbate back pain were: bed height adjustment (53.7%) and difficulty moving the patient (43.6%). In a study conducted on Thai nurses, a statistically significant relationship was observed between moving patients to bed without the help of specialized equipment and the lack of back muscle strengthening exercises and the severity of back pain [17]. The reality of the conditions in which nurses work leaves much to be desired. Too few nurses on call, too many patients in wards, lack of ergonomic solutions or auxiliary devices are often mentioned problems of modern nursing. Another important problem is the insufficient level of knowledge of nurses about the principles of work ergonomics. In the Tworek study [18], only 35% of respondents knew the norm allowed by Polish regulations for lifting and carrying loads by women in permanent work. Research conducted in 2015 in a group of 205 nurses participating in training as part of postgraduate education at the Academy of Health in Bydgoszcz confirmed the insufficient level of knowledge of nurses in the field of occupational health and safety. In the studied group, only 9.7% of respondents knew the permissible weight of lifting and carrying for women. At the same time, the cited study analyzes the self-assessment of nurses' knowledge about the principles of ergonomics in working with patients. 26.3% of respondents said that they know the rules of ergonomics, 54.1% of respondents said "rather yes". 13.2% of respondents answered "rather not". 6.3% of nurses responded negatively [19]. Insufficient knowledge of nurses in the field of work ergonomics was also confirmed by research conducted in a population of 213 nurses employed in four hospitals in Poznań [20]. In the own study, 83.6% of nurses stated that they adhere to the principles of ergonomics, 87.3% of respondents said that they know the permissible weight for lifting and carrying, with only 41.2% providing the correct value, which indicates overestimation of their knowledge.

The work of a nurse requires staying focused and constantly concentrating. Research by Przychodzka et al. [21] showed that 42% of respondents admitted that professional activity is significantly disturbed by pain in the spine [21]. In the Wyderka and Niedzielska studies, as many as 90% of the respondents thought that pain hindered their work, for 6% work became impossible, only 4% did not interfere in the performance of professional work [22]. Own research showed that in more than half of the respondents pain disrupted the work, while 44.5% sometimes were disturbed by pain.

In the summary, it is worth paying attention to the educational aspect in terms of improving working conditions, i.e. increasing the number of auxiliary equipment, increasing the number of staff on duty, not only nursing staff, but also auxiliary staff, and emphasizing health-promoting behaviors with developing a proper lifestyle. It is well known that an active lifestyle and practicing various types of sports affects the condition of the human motor apparatus and strengthens the muscular strength and contributes to maintaining a healthy weight, which also affects the occurrence of pain.

## V. CONCLUSIONS

- The occurrence of back pain is a significant problem in the professional group of nurses of the Bielsko-Biała Poviát.
- The largest percentage of people surveyed experience pain in the lumbar spine.
- Pain in the spine do not depend on age, education, the nature of the work performed and the position, while the longer the work experience, the more the pain increases.
- Back pain disrupts the functioning of nurses in professional and everyday life.
- There is a need to educate nursing staff on how to prevent back pain.

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