

## Health problems in elderly patients treated at the spa and rehabilitation hospital in Busko-Zdrój

### Problemy zdrowotne osób starszych korzystających z leczenia w szpitalu uzdrowiskowo-rehabilitacyjnym w Busku-Zdroju

Włodzisław Kuliński<sup>1,3</sup>, Agnieszka Nitera-Kowalik<sup>1,2</sup>, Bernard Solecki<sup>2</sup>

<sup>1</sup> Division of Physical Medicine, Jan Kochanowski University, Kielce

<sup>2</sup> 21<sup>st</sup> Military Spa and Rehabilitation Hospital in Busko-Zdrój

<sup>3</sup> Department of Rehabilitation, Military Medical Institute, Warsaw

#### Abstract

**Introduction.** Population ageing is a common phenomenon, resulting in an increase in the number of people over the age of 65 years. In 2035, this age group will constitute 23.2% of the population in Poland. **Aim.** To analyse the type and prevalence of various conditions as well as the physical therapy and rehabilitation procedures used in patients over the age of 65 years undergoing spa hospital treatment. **Material and methods.** The study involved 7296 patients undergoing treatment at the 21st Military Spa and Rehabilitation Hospital in Busko-Zdrój between 2015 and 2016. The majority of the patients (63.5%) were aged 65-74 years. The study analysed the patients' medical records and verified the following: age, sex, type of stay, type of condition by ICD-10 diagnosis, and the prescribed procedures. Pain severity in a VAS scale and functional status were measured in a group of 150 patients before and after the treatment; the patients were also asked how they assessed the efficacy of the treatment and whether they would like to undergo spa treatment again in the future. **Results.** The study unambiguously showed that the main conditions found in the patients were diseases of the musculoskeletal (ICD-10 XIII), circulatory (ICD-10 IX), and nervous (ICD-10 VI) systems. The patients were treated with physical therapy procedures, balneological procedures, kinesiotherapy, and massage. The treatment resulted in pain elimination or reduction and an improved functional status. **Conclusions.** 1. Musculoskeletal, cardiovascular and nervous system disorders are the most common health problems found in these patients and their prevalence increases with age. 2. The balneological and physical therapy procedures contributed to a better functional status in the patients and reduced the severity of pain. 3. Spa hospital treatment should be the main form of treatment and prevention in elderly patients. Due to its comprehensive nature, this form of treatment creates perfect conditions for implementation of the Long-Term Senior Policy in Poland for years 2014-2020. (Gerontol Pol 2018; 26; 14-20)

**Key words:** geriatric problems, spa treatment

#### Streszczenie

**Wstęp.** Starzenie się społeczeństwa jest zjawiskiem powszechnym. Efektem jest wzrost liczby osób powyżej 65 roku życia. W Polsce liczba ta w 2035 r. wzrośnie do 23,2%. **Cel pracy.** Analiza rodzaju oraz częstości występowania schorzeń i zastosowanego postępowania fizykalno-usprawniającego u osób 65 plus, korzystających z leczenia w szpitalu uzdrowiskowym. **Materiał i metody.** Badaniami objęto 7296 pacjentów przebywających na leczeniu w latach 2015-2016 w 21 WSzU w Busku Zdroju. Najliczniejszą grupę (63,5%) stanowili pacjenci w wieku 65-74 lata. Analizie poddano dokumentację medyczną badanych: weryfikowano - wiek, płeć, rodzaj pobytu, rodzaj schorzeń głównych według kodu ICD 10 oraz zleczone zabiegi. U 150 badanych oceniono przed i po leczeniu: stopień nasilenia dolegliwości bólowych w skali VAS, sprawność funkcjonalną, uzyskano opinie o skuteczności zabiegów i chęci ponownego podjęcia leczenia uzdrowiskowego. **Wyniki.** Bezwzględnie dominującymi wśród badanych były choroby układu mięśniowo-szkieletowego(ICD10-XIII), choroby układu krążenia (ICD 10-IX), choroby układu nerwowego (ICD10-VI). W leczeniu zlecano zabiegi fizykalne, balneologiczne, kinezyterapii, masaż. Po leczeniu uzyskano: ustąpienie lub redukcje dolegliwości bólowych oraz poprawę sprawności funkcjonalnej. **Wnioski.** 1. Choroby układu narządu ruchu, krążenia i nerwowego są dominujące, a ich częstość występowania rośnie wraz z wiekiem. 2. Zastosowane postępowanie balneo-fizykalne wpłynęło korzystnie na stan funkcjonalny i natężenie odczuwanych dolegliwości bólowych u badanych. 3. Leczenie w szpitalu uzdrowiskowym powinno być podstawową formą

Adres do korespondencji: ✉ Włodzisław Kuliński Zakład Medycyny Fizykalnej Uniwersytet Jana Kochanowskiego w Kielcach  
✉ wkulinski52@hotmail.com

leczenia i profilaktyki u osób starszych, poprzez swoją kompleksowość stwarza doskonałe warunki do realizacji programu długofalowej Polityki Senioralnej w Polsce na lata 2014-2020. (*Gerontol Pol* 2018; 26; 14-20)

**Słowa kluczowe:** *problemy geriatryczne, leczenie uzdrowiskowe*

## Introduction

Population ageing is a common phenomenon, resulting in an increase in the number of people aged over 65 years. In 2035, this age group will constitute 23.2% of the population in Poland; in 2060, the percentage will reach 36.1%. Disability in elderly people results from both ageing and disease [1-5]. Research conducted in Poland in 2002 showed that approximately 2.2 million people over the age of 65 years required the help of a carer with respect to at least one activity of daily living. Elderly patients typically have multimorbidity, i.e. suffer from multiple concomitant chronic conditions. According to Wieczorowska-Tobis, seniors most often have osteoarthritis (80% of patients over the age of 75 years), hypertension (60-70% of the patients), and ischaemic heart disease (30%); 20% of patients aged over 65 years have type 2 diabetes and 25% have COPD symptoms [6-10]. As the average life expectancy is rising, the associated significant changes in the population age group distribution, the prospect of faster population ageing in Poland as compared with other European countries, and a higher prevalence of chronic conditions in older patients all make it important to focus on the quality of life of the elderly related to their health and functional status. In this case, spa treatment and rehabilitation may, through their comprehensive character, play an important role in the prevention and treatment of this group of patients. Actions concerning this group should be aimed at maintaining the best functional status possible, which will allow the patients to remain independent and self-sufficient [11-19].

## Aim

The aim of this study was to analyse the type and prevalence of various conditions in patients over the age of 65 years undergoing spa hospital treatment and rehabilitation in Busko-Zdrój.

Moreover, the study aimed to assess the efficacy of comprehensive spa treatment and rehabilitation and their influence on the patients' functional status. We gathered opinions about the frequency of using this form of prevention and treatment at a spa hospital. An analysis was conducted to study the relationship between the form of stay at the hospital (paid by the Polish National Health Fund [NFZ] or a self-payer) and the type of condition and the therapeutic effects achieved.

## Material and methods

The study encompassed 7296 patients (50.6% of all patients treated) aged 65 years and over, undergoing spa treatment and rehabilitation at the 21st Military Spa and Rehabilitation Hospital in Busko-Zdrój in 2015-2016. The majority of the patients were aged 65-74 years (63.5% of the study patients; self-payers: 60.4%, NFZ: 68.1%), the second largest group included those aged 75-85 years (30.1% of the patients; self-payers: 32.2%, NFZ 27.2%); the smallest group (6.3%) consisted of patients aged 85 years and over (self-payers: 7.4%, NFZ: 4.8%). The mean age was 73.02 years, with the oldest patient being 99 years old. The majority of the patients were female (62.9%; self-payers: 62.2%, NFZ 64.0%), with men constituting 37.1% of the study group (self-payers: 37.8%, NFZ: 36.0%).

The study analysed the patients' medical records and verified the following: personal data (age, sex), type of stay, type of condition by ICD-10 diagnosis, and the prescribed procedures. Moreover, 150 randomly selected patients from the 65+ group were studied with the use of a diagnostic survey and a questionnaire (prepared for this particular study) to assess the degree of functional status improvement achieved during the treatment with respect to self-care and the activities of daily living, find out about the patients' opinions concerning the efficacy of the physiotherapeutic procedures and about the frequency of spa treatment, and ask whether they would like to undergo spa treatment and rehabilitation again in the future. Pain severity was measured with a visual analogue scale (VAS).

The data was statistically analysed with MS Excel and SOFA. The values calculated for measurable variables were presented as arithmetic means with standard deviation, median, and minimum and maximum values. Findings from different groups were compared using Student's t test for independent samples and correlation was calculated with a variant of Pearson's correlation using an  $\chi^2$  test. Changes were found to be statistically significant at  $p < 0.05$ .

## Results

In terms of the type of stay, the majority of the patients were undergoing commercial treatment, as compared to being referred for treatment by the NFZ. The percentage

of patients who received self-paid spa treatment and rehabilitation was 59.4% in 2015 and 58.5% in 2016.

The Polish National Health Fund (NFZ) covered the costs of spa treatment of 40.6% of patients treated in 2015 and 41.5% of those treated in 2016 (Table I).

Most patients (both in the case of treatment paid by the NFZ and self-payers) were diagnosed with diseases of the musculoskeletal system and connective tissue (86.3% and 92.1%, respectively). The second largest group included patients with cardiovascular disease (NFZ: 43.7%, self-payers: 41.7%). The third most numerous group were patients with nervous system disorders (NFZ: 36.2%, self-payers: 28.4%). A smaller group

encompassed patients with nutritional anaemia (NFZ: 15.8%, self-payers: 14.4%).

An analysis of the prevalence and type of conditions diagnosed in each age group showed that diseases of the musculoskeletal system and connective tissue were most common in all ages, with the following distribution: 65-74 years old – 88.3%, 75-84 years old – 91.5%, 85 years and over – 95.2%. A fairly large group consisted of patients with cardiovascular disease (65-74 years – 39.8%, 75-84 years – 46.3%, 85 years and over – 52.5%), nervous system disorders (65-75 years – 32.7%, 75-84 years – 29.8%, 85 years and over – 29.1%), and nutritional anaemia (65-74 years – 14.2%, 75-84 years – 17.1%, 85 years and over – 13.2%). The detailed data are presented in Table II.

**Table I. Type of stay**

	2015		2016	
	number	%	number	%
NFZ	1440	40.6%	1557	41.5%
Self-payer	2106	59.4%	2193	58.5%
Total	3546	100%	3750	100%
$\chi^2 =$	Rc =		df =	p =
0.625	0.013		1	0.45

The value of the Rc coefficient allows for concluding that there is a very weak correlation between the type of stay and the year of treatment.

**Table II. Conditions by age of the patients studied**

	65-74 years		75-84 years		85 years and over	
	No.	%	No.	%	No.	%
I. Certain infectious and parasitic diseases (A00-A99)	9	0.2%	4	0.2%	0	0.0%
II. Neoplasms (C00-C97)	45	1.0%	23	1.0%	4	0.9%
III. Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism (D50-D53)	8	0.2%	4	0.2%	2	0.4%
IV. Nutritional anaemias (D53.9)	659	14.2%	376	17.1%	61	13.2%
V. Mental and behavioural disorders (F00-F99)	9	0.2%	14	0.6%	4	0.9%
VI. Diseases of the nervous system (G00-G99)	1519	32.7%	654	29.8%	134	29.1%
VII. Diseases of the eye and adnexa (H00-H59)	11	0.2%	17	0.8%	6	1.3%
VIII. Diseases of the ear and mastoid process (H60-H95)	3	0.1%	6	0.3%	1	0.2%
IX. Diseases of the circulatory system (I00-I99)	1848	39.8%	1015	46.3%	242	52.5%
X. Diseases of the respiratory system (J00-J99)	201	4.3%	92	4.2%	22	4.8%
XI. Diseases of the digestive system (K00-K93)	203	4.4%	91	4.1%	25	5.4%
XII. Diseases of the skin and subcutaneous tissue (L00-L99)	82	1.8%	31	1.4%	2	0.4%
XIII. Diseases of the musculoskeletal system and connective tissue (M00-M99)	4101	88.3%	2006	91.5%	439	95.2%
XIV. Diseases of the genitourinary system (N00-N99)	143	3.1%	111	5.1%	32	6.9%
XVII. Congenital malformations, deformations and chromosomal abnormalities (Q00-Q99)	1	0.0%	2	0.1%	0	0.0%
XVIII. Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (R00-R33)	6	0.1%	5	0.2%	2	0.4%
XIX. Injury, poisoning and certain other consequences of external causes (S00-T98)	199	4.3%	116	5.3%	20	4.3%
XX. External causes of morbidity and mortality (V01-Y98)	1	0.0%	1	0.0%	0	0.0%
XXI. Factors influencing health status and contact with health services (Z00-Z99)	137	3.0%	54	2.5%	20	4.3%
$\chi^2 =$	Rc =		df =	p =		
102.800	0.093		36	0.001		

The value of the Rc coefficient allows for concluding that there is a very weak correlation between the age and diagnosis.

An analysis of the prevalence of health problems by sex showed that, irrespective of the patients' sex, the most common conditions were diseases of the musculoskeletal system and connective tissue (women: 92.1%, men: 54.2%). There were also fairly many patients with cardiovascular disease (women: 41.7%, men: 27.8%) and nervous system disorders (women: 30.3%, men: 21.4%).

An analysis of the procedures prescribed in each age group revealed that patients aged 65-74 years usually underwent physical therapy procedures (98.4%), balneological procedures (93%), kinesiotherapy (91.1%), and massage (81.8%); other procedures (speech therapy, meetings with a psychologist) were prescribed in 10.7% of cases.

Patients aged 75-84 years underwent physical therapy procedures (98.5%), balneological procedures (93.7%), massage (84.7%), kinesiotherapy (84.4%), and speech and psychological therapy (13.4%).

Those aged 85 years and over underwent physical therapy procedures (98.9%), balneological procedures (90.2%), massage (83.7%), kinesiotherapy (70.5%), and other procedures (16.5%). The details are presented in Table III.

The procedures prescribed to women were as follows: physical therapy procedures (98.7%), balneological procedures (93.6%), kinesiotherapy (88.2%), massage (82%), and other procedures (11.8%).

Among the men studied, 98.2% underwent physical therapy procedures, 92.1% underwent balneological procedures, 87.1% received kinesiotherapy, 84.2% were prescribed massage, and 12.1% underwent other procedures.

As for the frequency of undergoing spa treatment and rehabilitation, slightly more than a half of the patients (50.3%) were receiving it for the first time, 21.9% of the patients had been treated more than 3 times, 19.4% were in a spa hospital for a second time, and 8.4% were staying at a spa hospital for a third time. The number of patients undergoing spa treatment and rehabilitation for a second or third time and those who received it more times was higher among patients who paid for the treatment themselves.

The vast majority of the patients (95.5%) had chronic conditions. Before the treatment, the study patients usually described their pain in a VAS scale as severe (48.4%) or moderate (29.7%) and 11.0% of the subjects described it as difficult to bear. After the treatment, the results of pain severity assessment in a VAS scale were as follows: 40.6% of the patients experienced mild pain, 37.4% reported moderate pain, 11.6% complained of severe pain, and 10.3% did not report any pain after their spa treatment (the difference was statistically significant,  $p < 0.001$ ) (Table IV).

**Table III. Type of procedures – age**

	65-74 years		75-84 years		85 years and over	
	No.	%	No.	%	No.	%
balneology	4317	93.0%	2054	93.7%	416	90.2%
physical therapy	4569	98.4%	2161	98.5%	456	98.9%
kinesiotherapy	4229	91.1%	1850	84.4%	325	70.5%
massage	3798	81.8%	1858	84.7%	386	83.7%
other	499	10.7%	294	13.4%	76	16.5%
$\chi^2 =$	Rc =		df =		p =	
42.151	0.046		8		0.001	

The value of the Rc coefficient allows for concluding that there is a very weak correlation between the age of the patients and the type of procedures they underwent.

**Table IV. Pain severity in a VAS scale before and after treatment – Student's t test values**

Value	Self-payer		NFZ		Change (improvement)	
	Before treatment	After treatment	Before treatment	After treatment	Self-payer	NFZ
$\bar{x}$	3.627	6.314	6.827	3.567	2.740	3.260
$\Sigma$	2.12	2.62	2.46	2.21	1.88	2.07
med	4	7	7	3	2	3
Min	0	0	0	0	0	0
max	8	10	10	9	6	10
$\Delta\bar{x}$	2.69		3.26		0.52	
$\Delta\bar{x}$ (%)	74.05%		47.75%		18.96%	
t in Student's t test	10.083		16.083		1.503	
p in Student's t test	< 0.001 – difference was statistically significant		< 0.001 – difference was statistically significant		0.135 – difference was not statistically significant	



**Table V. Patients' ability to perform the activities of daily living and self-care activities**

	Self-payer		NFZ referral		Total	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Excellent	11.8%	23.5%	5.8%	24.0%	7.7%	23.9%
Good	39.2%	68.6%	23.1%	64.4%	28.4%	65.8%
Fair	41.2%	5.9%	58.7%	8.7%	52.9%	7.7%
Poor	7.8%	0.0%	9.6%	0.0%	9.0%	0.0%
I have no opinion	0.0%	2.0%	1.9%	1.9%	1.3%	1.9%

Before the treatment, when asked about their ability to perform the activities of daily living and self-care activities, most patients (52.9%) described it as fair, 28.4% as good, and 9% assessed their functional status as poor.

After the treatment, approximately two thirds of the patients (65.8%) described their ability to perform the activities of daily living and self-care activities as good, 23.5% as excellent, and only 7.7% as fair (Table V).

The patients were asked to express their opinion about the efficacy of the physical therapy procedures they had received. Both groups of patients (NFZ patients and self-payers) listed balneotherapy and hydrotherapy as the most important (excellent results – 80%, good results – 14.2%). Physical therapy was also seen as very useful (excellent – 66.5%, good – 21.3%).

As many as 96.1% of all the patients studied, including 97.1% of the NFZ patients and 94.1% of those who paid for their treatment themselves, declared that they would definitely want to come back to the 21st Military Spa and Rehabilitation Hospital in Busko-Zdrój.

## Discussion

Due to their visible social, medical, economic, and sociological importance, health problems of the elderly have been widely discussed by many authors [1-5,11,12]. This study aimed to look at health problems found in people aged 65 years and over from the perspective of patients undergoing spa treatment covered by the NFZ or paid by the patients themselves. The majority of the study group, both in 2015 and 2016, were patients who paid for their spa treatment and rehabilitation themselves (59.14% and 58.5% of the seniors, respectively). This suggests that elderly patients are interested in improving their health and place trust in the methods and means of spa treatment. The lower percentage of NFZ patients in the population studied (40.6% in 2015 and 41.5 in 2016) is in keeping with the call formulated by the team of experts from the PolSenior study, who urged for a broader access to rehabilitation, even for the oldest

patients, as this could prevent disability and help the patients remain independent [11-13].

Involitional biological changes occurring in the body as part of the ageing process increase the risk of disability. The prevalence analysis revealed that the most common diseases present in the patients were musculoskeletal disorders, followed by cardiovascular disease and nervous system disorders.

It is important to note that the incidence of chronic conditions increases with age [4,11,12]. Of the 150 patients studied, 95.5% had chronic diseases. Multimorbidity involving numerous chronic disorders of the musculoskeletal, nervous, or cardiovascular system is associated with an increasing severity of pain. The PolSenior study of Polish patients showed that the elderly most often complained of pain in their lumbar spine and lower limb joints.

In our study, pain severity measured before treatment was high and similar in both groups. After comprehensive spa treatment, the number of patients in the study group experiencing severe pain decreased from 48.4% to 11.6%. The improvement was statistically significant ( $p < 0.001$ ).

Chronic pain, particularly in the case of elderly persons, may contribute to a deterioration of the functional status, worsening disability, a higher risk of falls and their sequelae, a deterioration in the mental status, and loss of independence, often due to the development of frailty syndrome. According to Kuliński, more than 50% of people aged over 75 years have frailty syndrome, which manifests itself in the form of weakness as well as loss of muscle mass and strength, quickly resulting in complete disability [11]. The fact that many symptoms of frailty syndrome may be eliminated once they are diagnosed is a positive prognostic factor and highlights the importance of functional status assessment in determining the level of independence in terms of the ability of elderly patients to perform the activities of daily living unassisted.

To prevent dysfunctions resulting from disease in the ageing period, elderly patients need to undergo a com-

prehensive rehabilitation programme. Such a programme may be implemented through spa treatment. The use of balneological stimuli, physical therapy procedures, and kinesiotherapy ensures both systemic and local effects in the case of local disorders. Systematic kinesiotherapy may delay the involuntional changes. The use of these therapeutic possibilities helps conduct appropriate non-invasive rehabilitation and limits the duration of disability in the patients [11-13]. Our analysis of the procedures prescribed in each age group and their distribution by sex revealed that the highest number of procedures were physical therapy procedures, which showed an upward trend with age: they were prescribed in 98.4% of patients aged 65-74 years, 98.5% of those aged 75-84 years, and 98.9% of persons aged 85 years and over. The second most common group of procedures were balneological procedures, whose frequency was similar in all age groups, but with a slight downward trend in the 85+ group. The third most common treatment used in patients aged 65-74 years and in men and women was kinesiotherapy and the fourth was massage; in the 75-84 and 85+ age groups, the order was reversed (classic massage followed by kinesiotherapy). The smallest percentage of patients underwent other procedures (speech therapy, meetings with a psychologist); there was an upward trend in the oldest patients (aged 85 years and over). Extending the therapeutic effects by adding the support of a psychologist or dietician helps combat the patients' organic and mental problems.

The study results described in this paper allow for concluding that the patients' ability to perform the activities of daily living and self-care activities improved after the treatment.

The percentage of patients assessing this ability as good increased after the treatment from 28.4% to 65.8%. In addition, 23.9% of the patients assessed their post-treatment functional status as excellent. After the spa treatment was completed, no patient reported their ability to perform basic everyday and self-care activities as poor.

An interesting finding from our study concerns patient-reported efficacy of the procedures they underwent. According to the patients, the procedures with the most significant influence on their health were: balneotherapy and hydrotherapy (94.2% of excellent and good results)

and physical therapy procedures (87.8% of excellent and good results). There was a discrepancy with respect to the patients' opinions about the significance of kinesiotherapy and movement in terms of improving the functional status, particularly in the case of musculoskeletal disease, cardiovascular disease, and nervous system disorders, which were the most commonly reported conditions. Consequently, there is a need for patient education with respect to the benefits of movement (exercise, health-related training, regular physical activity) for maintaining a good functional status and health. Research conducted by the Central Statistical Office of Poland (GUS) in 2009 showed that more than 1 (79.3%) of the Polish population over the age of 60 years were physically inactive and as few as 20% of the elderly followed the recommendations on optimal daily physical activity according to the WHO and EU guidelines. Due to its comprehensive nature, spa treatment creates perfect conditions for implementation of the Long-Term Senior Policy in Poland for years 2014-2020.

## Conclusions

1. The most common disorders found in the study group were diseases of the musculoskeletal system and connective tissue (ICD-10 XIII).
2. Organic disorders (musculoskeletal disorders, cardiovascular disease, neurological conditions) predominate in all age groups and their prevalence increases with age.
3. The balneological and physical therapy procedures used in the patients resulted in an improved functional status and pain reduction.
4. Spa hospital treatment should be the main form of treatment and prevention in elderly patients.
5. Due to its comprehensive nature, spa treatment creates perfect conditions for implementation of the Long-Term Senior Policy in Poland for years 2014-2020.

## Conflict of interest

None

**References**

1. Marchewka A, Dąbrowski Z, Żołądź J. Fizjologia starzenia się. Profilaktyka i rehabilitacja. Wydawnictwo naukowe PWN Warszawa.2013;5:2-244.
2. Gu J, Chao J, Chen W, et al. Multimorbidity and health-related quality of life among the community-dwelling elderly: a longitudinal study. *Arch Gerontol Geriatr.* 2017;74:133-40.
3. Cuevas-Trisan R. Balance problem and fall risks in the elderly. *Phys Med Rehabil Clin N Am.* 2017;28(4):727-37.
4. Żak M. Rehabilitacja osób po 80 roku życia z zaburzeniami czynności życia codziennego. *Gerontol Pol.* 2005;3:200-5.
5. Saldana SJ, Marsh AP, Rejeski WJ, et al. Assessing balance through the use of a low-cost head-mounted display in older adults: a pilot study. *Clin Interv Aging.* 2017;26(12):1363-70.
6. Cytowicz-Karpiłowska W, Kazimierska B, Cytowicz A. Postępowanie usprawniające w geriatricii. Warszawa: WSE; 2009.
7. Famuła A i wsp. Stabilność ciała osób w wieku podeszłym w aspekcie ich codziennej aktywności ruchowej. *Post Reh.* 2012;2:5-14.
8. Grzanka-Tykwińska A, Kędziora-Kornatowska. Znaczenie wybranych form aktywności w życiu osób w podeszłym wieku. *Gerontol Pol.* 2010;18:29-32.
9. Masuki S, Morikawa M, Nose H. Interval walking training can increase physical fitness in middle aged and older people. *Exerc Sport Sci Rev.* 2017;45(3):154-62.
10. Wieczorowska-Tobis K. Podstawowe pojęcia geriatricii i gerontologii. W: Wieczorowska-Tobis K, Kostka K, Borowicz A. Fizjoterapia w geriatricii. Warszawa: PZWL; 2011.
11. Kuliński W. Fizjoterapia w profilaktyce niepełnosprawności u osób w wieku podeszłym. *Gerontol Pol.* 2017;25(1):39-44.
12. Nitera-Kowalik A, Majcher B, Jaworska J i wsp. Wpływ kinezyterapii ogólnousprawniającej na poprawę sprawności funkcjonalnej osób po 60 roku życia w kompleksowym leczeniu uzdrowiskowym. *Acta Balneol.* 2016;2:104-9.
13. Nitera-Kowalik A, Olszewska E, Smyda A. Leczenie uzdrowiskowe sposobem przeciwdziałania negatywnym skutkom procesu starzenia. *Acta Balneol.* 2016;2:110-7.
14. Łukasik A, Barylski M, Irzmański R. Rehabilitacja osób w wieku podeszłym – terapia z wyboru dla starzejącego się społeczeństwa. *Geriatricia.*2011;5:315-23.
15. Kozak-Szkopek E, Mossakowska M, Ślusarczyk P, Broczek K, Szybalska A, Wieczorowska-Tobis K. Analiza występowania bólu przewlekłego u osób starszych w Polsce. W: *Aspekty medyczne, psychologiczne i socjologiczne i ekonomiczne starzenia się ludności w Polsce. Polsenior.* Warszawa: Termedia Wydawnictwo Medyczne; 2012. ss. 295-306.
16. Łój G. Rehabilitacja a jakość życia osób w starszym wieku. *Gerontol Pol.* 2007;15(4):153-5.
17. Wizner B, Skalska A, Klich-Rączka A i wsp. Ocena stanu funkcjonalnego u osób w starszym wieku. W: *Aspekty medyczne, psychologiczne, socjologiczne i ekonomiczne starzenia się ludności w Polsce. Polsenior.* Warszawa: Termedia Wydawnictwo Medyczne; 2012. ss. 295-306.
18. Kuliński W. Znaczenie medycyny fizykalnej w profilaktyce niepełnosprawności u osób w wieku podeszłym. *Acta Balneol.* 2011;53(3):201-2.
19. Kuliński W. Fizykoterapia. W: *Rehabilitacja Medyczna.* Wrocław: Wyd. Elsevier Urban Partner; 2012. ss. 351-4.