Assessment of physical activity in elderly people using a PASE questionnaire in accordance with the selected MKB-10 disease category

Starc, Andrej; Lončarek, Karmen; Crnković, Ivana

Source / Izvornik: **Medica Jadertina, 2020, 50, 293 - 301**

Journal article, Published version
Rad u časopisu, Objavljena verzija rada (izdavačev PDF)

Permanent link / Trajna poveznica: https://urn.nsk.hr/urn:nbn:hr:184:474258

Stručni članak
Professional paper

ISSN 1848-817X
Coden: MEJAD6 50 (2020) 4

Assessment of physical activity in elderly people using a PASE questionnaire in accordance with the selected MKB-10 disease category

Procjena razine tjelesne aktivnosti osoba starije životne dobi uz pomoć PASE upitnika prema odabranim MKB-10 kategorijama oboljenja

Ivana Crnković, Karmen Lončarek, Andrej Starc[*]

Summary

Practising a sitting way of life in elderly people can result in a lowered level of physical activity with an increased risk of developing cardiovascular diseases. The aim of this research is to ascertain the level of physical activity in elderly people and in which group they belong according to the selected MKB-10 disease category using a PASE questionnaire as a measuring instrument. Participants (N = 100) that can partake in physical activity on their own or with assistance were included in this study. They were distributed into three groups categorized by the International Classification of Diseases and related medical issues (MKB-10). The first group consisted of people with musculoskeletal disorders (N = 34), the second included cardiovascular diseases (N = 35) and the third included participants with neurological disorders (N = 31). The PASE questionnaire was used in order to evaluate the level of physical activity. The results of this research confirm that most elderly people practise a sitting way of life with a low level of physical activity and an increased BMI index in all observed groups. According to the results of this study, there was no statistically significant difference between the three observed groups in regards to physical activity, BMI and sitting activity. In further research, it is needed to design measuring instruments for assessing the level of physical activity in elderly people that would enable defining limiting factors for including people of this age group in physical activity.

Key words: physical activity, elderly people, MKB-10, PASE

Sažetak

Prakticiranje sjedalačkog načina života kod osoba starije životne dobi rezultira niskom razinom tjelesne aktivnosti uz povećan rizik za razvoj kardiovaskularnih bolesti. Cilj ovog istraživanja je utvrđivanje razine tjelesne aktivnosti osoba starije životne dobi prema odabranim MKB-10 kategorijama oboljenja kojoj pripadaju uz pomoć mjernog instrumenta PASE upitnika. U istraživanju je sudjelovalo 100 sudionika koji mogu samostalno ili uz asistenciju sudjelovati u tjelesnoj aktivnosti, raspoređeni u tri skupine kategorizirane prema Međunarodnoj klasifikaciji bolesti i srodnih zdravstvenih problema (MKB-10). Prvu skupinu činila je kategorija osoba s mišićno-koštanim oboljenjem (N = 34), druga skupina obuhvatila je osobe s kardiovaskularnim oboljenjem (N = 35) dok je treća skupina obuhvatila osobe s neurološkim oboljenjem (N = 31). U istraživanju se koristio PASE upitnik za procjenu razine tjelesne aktivnosti. Rezultati ovoga istraživanja potvrđuju da većina osoba starije životne dobi prakticira sjedalački način života uz nisku razinu procijenjene tjelesne aktivnosti, te uz povećan BMI indeks u svim promatranim skupinama. Prema rezultatima ovoga istraživanja nije pronađena statistički značajna razlika između sve tri promatrane skupine u domeni tjelesne aktivnosti, BMI-a, te aktivnosti provedenoj u sjedenju. U budućim istraživanjima potrebno bi bilo dizajnirati mjerene instrumente za procjenu razine tjelesne aktivnosti osoba starije životne dobi koji bi omogućili definiranje ograničavajućih čimbenika kod uključivanja ove dobne skupine u tjelesnu aktivnost.

Ključne riječi: tjelesna aktivnost, osobe starije životne dobi, MKB-10, PASE Q

Med Jad 2020;50(4):293-301

[*]**University of Applied Health Sciences,** Department of physiotherapy, Zagreb (Ivana Crnković, MA); **University of Rijeka, Faculty of medicine,** Department of ophthalmology, Croatia (Karmen Lončarek, PhD); **University of Ljubljana, Faculty of health sciences,** Department of public health, Slovenia (Andrej Starc, PhD)

Correspondence address / *Adresa za dopisivanje:* Ivana Crnković, University of Applied Health Sciences Zagreb, Mlinarska cesta 38, 10 000 Zagreb. E-mail: ivana.crnkovic@zvu.hr

Received /*Primljeno* 2020-02-24; Revised/ *Ispravljeno* 2020-07-20; Accepted /*Prihvaćeno* 2020-08-21

Introduction

A healthy and active aging process implies a lifestyle that consists of a wide spectre of physical, psychological and social activities that have a positive effect on the said process and regardless of their chronological age, every person should be able to partake in a certain form of physical activity. Old age should not represent a limiting factor for exercising, but instead it should be mental and physical hygiene that enables more freedom, autonomy and satisfaction.[1,2] Old age and inactivity cause changes that can be decreased and kept under control with regular physical activity. With advancing age and a reduced level of physical activity, there is a growing number of chronic diseases that can be well controlled with regular and moderate physical activity. Some of those diseases are: increased blood pressure, diabetes, hyperlipidaemia, osteoporosis, obesity, strokes, and chronic cardiovascular diseases. Every person, regardless of their chronological age, is capable of partaking in some form of physical activity where old age is not a limiting factor. Physical activity represents mental and physical hygiene that enables more freedom, autonomy and satisfaction.[2] Physical activity is an important component of everyday life for elderly people that affects an array of related components such as their health status, view of their health and appearance, mental health and everyday life activities. Despite evidence on health benefits of regular physical activity, 61% of elderly people aged 65 and more still do not comply to the recommendations of at least 30 minutes of moderate physical activity five or more times a week.[3] This data is also confirmed by the Reference Centre of the Health Ministry of the Republic of Croatia that deals with protecting the health of elderly citizens because common negative health behaviours can be seen in homes for elderly people across Croatia: physical inactivity (42.19%), lack of personal and environment hygiene maintenance (13.54%), not following doctor's recommendations (10.42%) and mental inactivity (10.42%).[4] Within institutionalized care of elderly people, there is organized physical activity and corrective gymnastics for all beneficiaries, but there is still a relatively small number of elderly people that are regularly involved in some form of physical recreation. With a growing trend of the elderly population and their increasing life expectancy, there is an interest in developing methods for monitoring and measuring physical activity in elderly people. In order to determine the best way to increase physical activity in elderly people, the key significance represents to ascertain their present health habits and the necessity to use a precise and reliable method for assessing physical activity. The main goal of this research is to determine the level of physical activity in elderly people in accordance with the selected MKB-10 disease category and in which group they belong to using a PASE (Physical Activity Scale for The Elderly) questionnaire as a measuring instrument. The evaluation of physical activity values using a measuring instrument will enable the design of desired intervention related to elderly people partaking in physical activity.

Research methodology

Sample

Participants (N = 100) that can partake in physical activity on their own or with assistance were included in this study and, according to their chronological age, they belong to the elderly age group ranging from 65 ± 28 years of age (M = 77). Elderly people were distributed into three groups categorized by the International Classification of Diseases and Related Medical Issues (MKB-10). The first group consisted of people with musculoskeletal disorders (N = 34), the second one included people with cardiovascular diseases (N = 35) and the third one included people with neurological disorders (N = 31). In our analysis, we found a larger number of female participants living in retirement homes. The majority of participant has declared to have a high school or high education regardless of the group they belonged to. The biggest percentage of participants stated being widowed and with/without partner according to their marital status.

Measuring Instruments

A socio-demographic questionnaire was used. The demographic part of the questionnaire consisted of questions regarding age, sex, education and marital status of participants included in the study. We have used medical documentation to determine the health status of every individual participant. The anthropometric variable that was used to calculate the indicator of nutritional status in the framework of this research was the Body Mass Index (MBI). According to the results of BMI values, < 18.5 signifies an individual being underweight, 18.5-24.9 signifies normal weight, 25.0-29.9 signifies an individual being overweight and 30.0 and over means obesity.[5,6]

The PASE questionnaire was developed by Washburn et al. PASE was designed as a short

questionnaire consisting of 10 questions that are used to assess physical activity in elderly people experienced during their last week. The questionnaire consists of questions regarding working activities, house chores and leisure time. The frequency of these activities is classified as "never", "seldom" (1-2 days a week), "sometimes" (3-4 days a week) and "often" (5-7 days a week). The duration is also categorized as lasting less than 1 hour a day, lasting 1 to 2 hours, between 2 and 4 hours and more than 4 hours a week. The final results of the PASE activity are determined by multiplying the time that a participant has spent doing a certain activity (hour/week).[7] As the PASE questionnaire has not yet been translated into Croatian, the original English version was translated by two independent translators and by comparing the two translations, we have reached the final questionnaire version. The time required to complete the questionnaire is between 6 minutes and half an hour. The methodological validity, along with good metric characteristics of the PASE questionnaire is the reason we have included this measuring instrument into our research.

Procedure

The theoretical part, as a fundamental method, included descriptive work with reviewing relevant references and researching the domain of physical activity within the analysed age group. In order to conduct this research, we have requested a permission from the City Office for Social Services and Persons with Disabilities (Classification: 550-01/15-001/448, CASE No.: 251-17-11/24-15-2) and from individual directors of retirement homes for elderly people. Data was gathered using a structured interview method and there is an appropriate sample in this research. The study was conducted in retirement homes for the elderly in the City of Zagreb and Zagreb County. The three biggest retirement homes for the elderly in the City of Zagreb and Zagreb County were chosen. The used questionnaires had basic information about the research and an informed consent. All participants were presented with reasons for and procedures of the study. Physiotherapists conducted this research. The research procedure was implemented in accordance with the Nürnberg code and the newest review of the Helsinki Declaration. Socio-demographic data was analysed using descriptive statistics and frequency tables. The hi-square test was used for testing the statistical difference between categories (groups) in regards to the described data. Variance analysis (ANOVA) was used for testing the statistical difference between categories (groups) in regards to numerical data. Statistical testing was conducted with statistical relevance of 95& ($p < 0.05$). The statistical data is shown in graphs and tables. Statistical processing was done using the STATISTICA 6.1 StatSoft Inc., USA, 1983-2003 program.

Results

According to the results shown in Table 1, Skewness (asymmetrical distribution coefficient) and Kurtosis (distribution flatness coefficient) results signify deviations for normal distribution which is mostly visible in elderly people with neurological diseases.

When asked how often elderly people participate in sitting activities regardless of the group they belong to, it is evident that the majority of them does it frequently; between two and four hours a day, reading or watching television (see Table 2).

The differences between analysed groups in regards to evaluating the levels of physical activity using a PASE questionnaire are shown in Table 3. According to the results of this research, elderly people, regardless of the group they belong to, have a low level of assessed physical activity. According to the New England Research Institutes (NERI) organization, the result range with mean values for the population older than 65 years of age is M = 102, SD = 64.1. The BMI result range indicates a greater risk for developing cardiovascular diseases regardless of the elderly analysed group.

Table 1 Asymmetrical distribution and distribution flatness coefficients
Tablica 1. Asimetrična raspodjela te koeficijenti ravnomjernosti raspodjele

	Musculoskeletal disorders *Poremećaji mišićno-koštanog sustava*		Cardiovascular diseases *Kardiovaskularne bolesti*		Neurological disorders *Neurološki poremećaji*	
	Skewness *Iskrivljenost*	Kurtosis *Kurtoza*	Skewness *Iskrivljenost*	Kurtosis *Kurtoza*	Skewness *Iskrivljenost*	Kurtosis *Kurtoza*
BMI	0.331	-0.594	1.256	2.685	2.863	10.607
PASE total/*ukupno*	0.992	0.801	0.691	0.093	2.003	7.096

Table 2 Participation of analysed groups in sitting activities during their last week
Tablica 2. Sudjelovanje analiziranih skupina u sjedećim aktivnostima u posljednjih tjedan dana

How often have you participated in sitting activities such as reading, watching television and handwork in the last seven days? *Koliko ste često sudjelovali u aktivnostima sjedenja poput čitanja, gledanja televizije te ručnog rada posljednjih sedam dana?*				
	Musculoskeletal disorders *Poremećaji mišićno-koštanog sustava*	Cardiovascular diseases *Kardiovaskularne bolesti*	Neurological disorders *Neurološki poremećaji*	Total *Sve-ukupno*
Never *Nikada*	0	1	0	1
%	0.00%	2.86%	0.00%	
Seldom *Rijetko*	3	1	3	7
%	8.82%	2.86%	9.68%	
Sometimes *Ponekad*	6	7	5	18
%	17.65%	20.00%	16.13%	
Often *Često*	25	26	23	74
%	73.53%	74.29%	74.19%	
Total *Sveukupno*	34	35	31	100
What were does activities? / *Što su bile te aktivnosti?*				
	Musculoskeletal disorders *Poremećaji mišićno-koštanog sustava*	Cardiovascular diseases *Kardiovaskularne bolesti*	Neurological disorders *Neurološki poremećaji*	Total *Sve-ukupno*
Does not partake *Ne sudjeluju*	0	1	0	1
%	0.00%	2.86%	0.00%	
TV, reading *TV, čitanje*	21	19	20	60
%	61.76%	54.29%	64.52%	
Reading, writing *Čitanje, pisanje*	0	1	0	1
%	0.00%	2.86%	0.00%	
Tv, Internet *TV, internet*	0	0	1	1
%	0.00%	0.00%	3.23%	
Total *Sveukupno*	34	35	31	100
On average, how many hours a day have you spent partaking in such sitting activities? *Koliko u prosjeku potrošite sati dnevno u sjedećim aktivnostima?*				
	Musculoskeletal disorders *Poremećaji mišićno-koštanog sustava*	Cardiovascular diseases *Kardiovaskularne bolesti*	Neurological disorders *Neurološki poremećaji*	Total *Sve-ukupno*
Does not partake *Ne sudjeluje*	0	1	0	1
%	0.00%	2.86%	0.00%	
Less than 1 hour *Manje od 1 sata*	6	6	5	17

%	17.65%	17.14%	16.13%	
Between 1 and 2 hours/*Između 1 i 2 sata*	9	6	11	26
%	26.47%	17.14%	35.48%	
Between 2 and 4 hours/*Između 2 i 4 sata*	12	20	10	42
%	35.29%	57.14%	32.26%	
More than 4 hours *Više od 4 sata*	7	2	5	14
%	20.59%	5.71%	16.13%	
Totals *Sveukupno*	34	35	31	100

Table 3 Level of total physical activity during their last week obtained using a PASE Q and BMI on analysed groups

Tablica 3. Razina ukupne tjelesne aktivnosti tijekom posljednjih tjedan dana dobivena pomoću PASE Q i BMI kod analiziranih skupina

Musculoskeletal disorders / *Poremećaji mišićno-koštanog sustava*			
	Mean *Prosječno*	Median S*rednje*	Standard Deviation *Standardna devijacija*
BMI	26.820	26.871	3.574
PASE total *PASE sveukupno*	50.906	45.075	40.385
Cardiovascular diseases / *Kardiovaskularne bolesti*			
	Mean *Prosječno*	Median S*rednje*	Standard Deviation *Standardna devijacija*
BMI	25.787	25.335	3.631
PASE total *PASE sveukupno*	50.833	39.890	32.477
Neurological disorders / *Neurološki poremećaji*			
	Mean *Prosječno*	Median S*rednje*	Standard Deviation *Standardna devijacija*
BMI	26.627	25.712	4.796
PASE total *PASE sveukupno*	44.372	36.130	30.091

According to the results obtained with this research (see Figures 1 and 2), the hi-square test shows that there is no statistically significant difference between the analysed groups in regards to the sitting activity (χ^2 = 3.336; df = 6; p = 0.766) on a weekly basis and sitting activity in regards to its duration in hours (χ^2 = 9.857; df = 8; p = 0.275).

For the purposes of assessing differences between analysed groups in regards to the BMI index and total PASE questionnaire score, a 2x2 two-way variance analysis (ANOVA) was applied. ANOVA shows that there is no statistically significant difference between groups regarding BMI (F = 0.646; p = 0.527) and the level of physical activity (F = 0.375; p = 0.688) the data of which is shown in Figures 3 and 4.

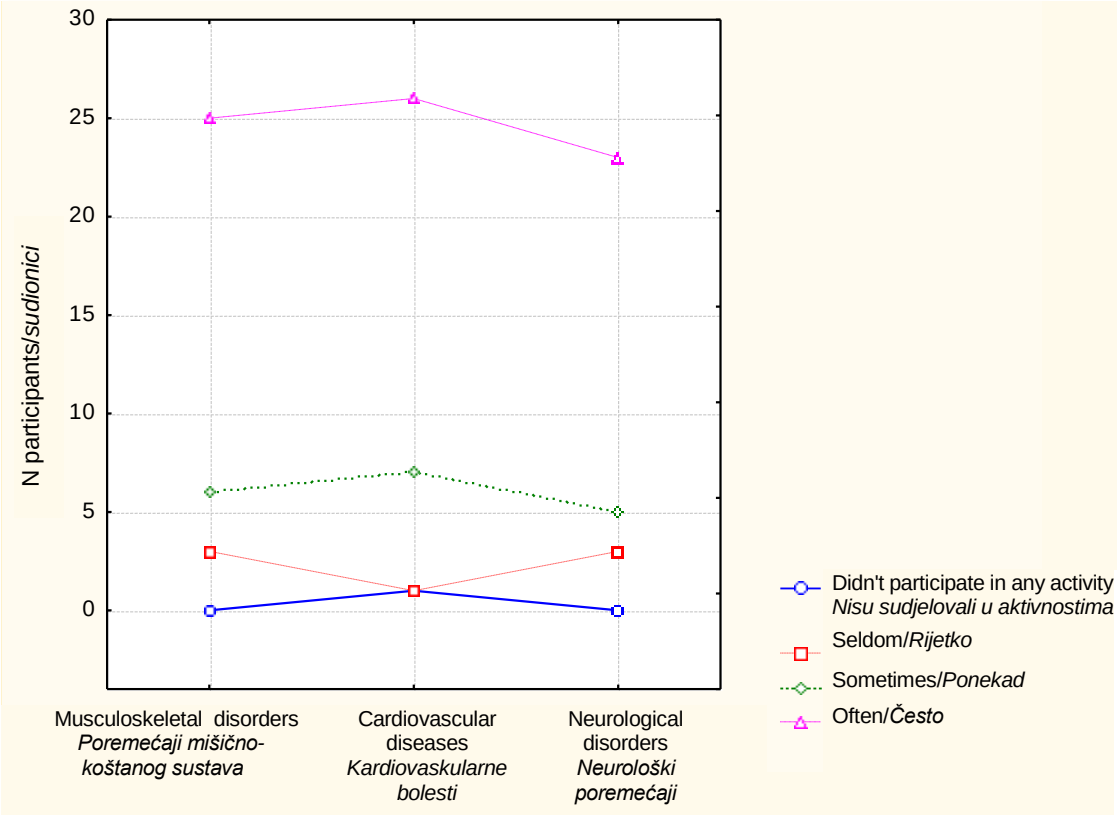

Figure 1 Differences between analysed groups in regards to assessing the sitting activity during their last week
Slika 1. Razlike između analiziranih skupina u odnosu na procjenu sjedećih aktivnosti u proteklom tjednu

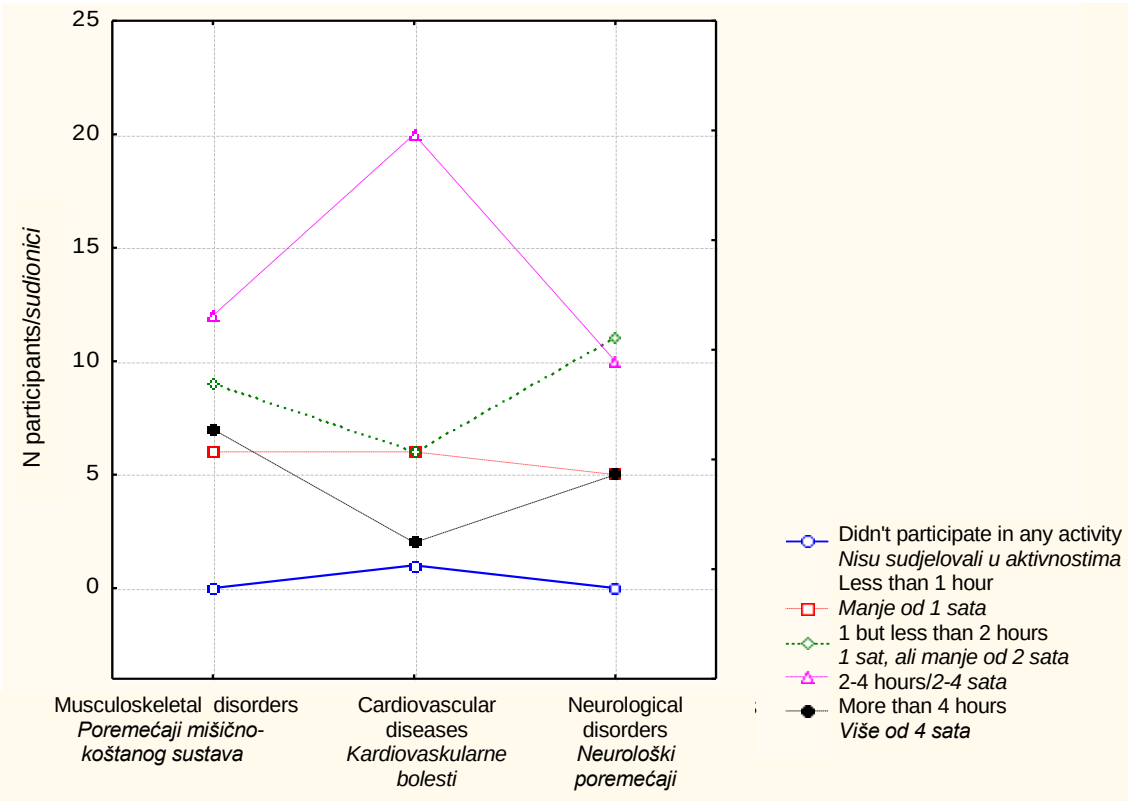

Figure 2 Differences between analysed groups in regards to assessing the sitting activity during their last week according to its duration
Slika 2. Razlike između analiziranih skupina u odnosu na procjenu sjedećih aktivnosti u proteklom tjednu prema trajanju

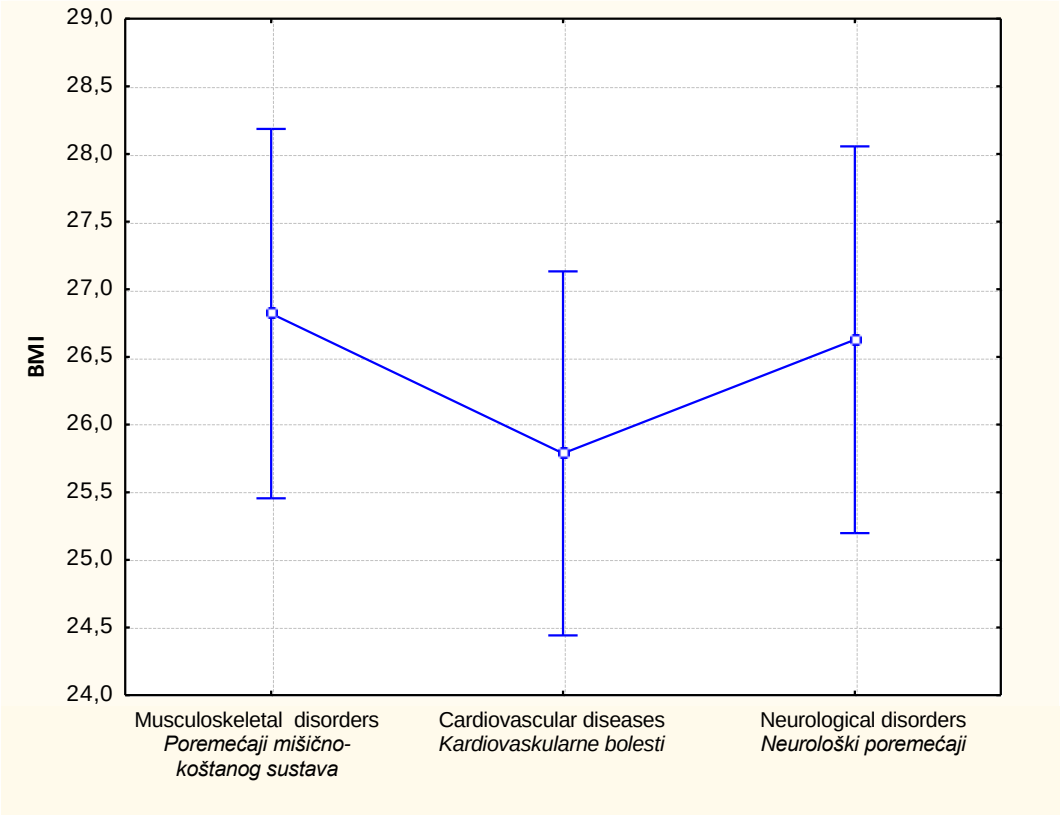

Figure 3 Testing the statistical difference between groups in regards to BMI
Slika 3. Testiranje statističkih razlika između skupina u odnosu na BMI

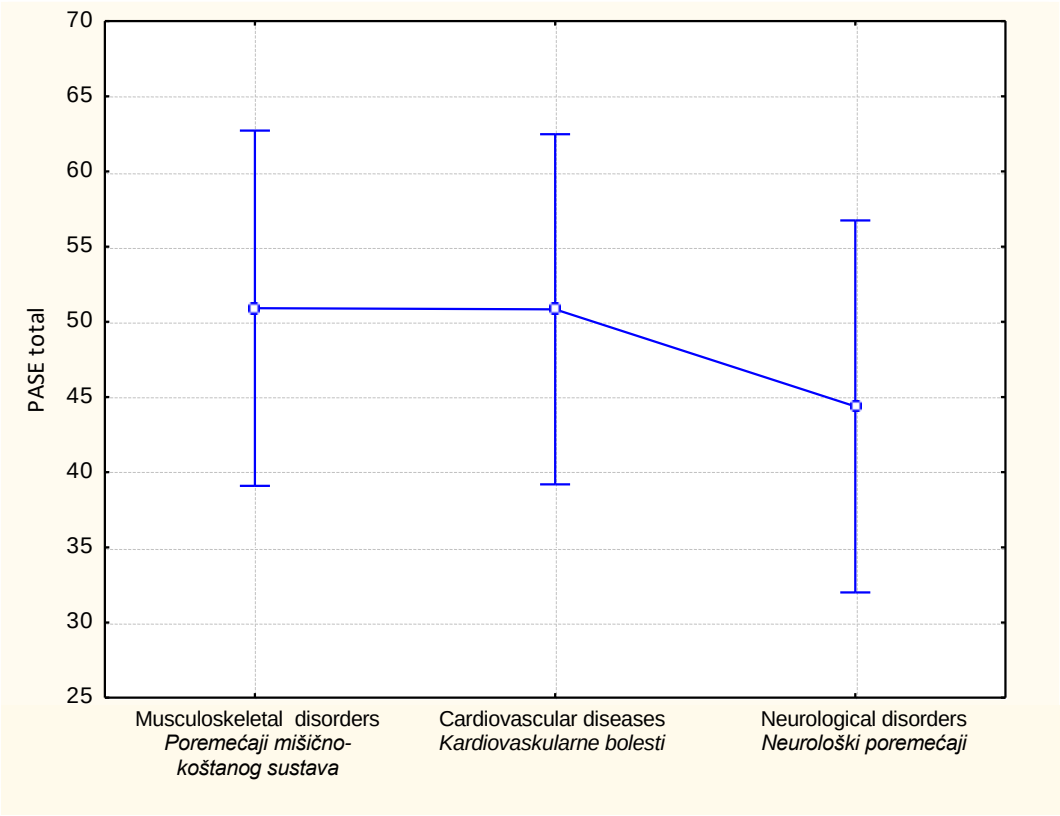

Figure 4 Testing the statistical difference between groups regarding the total PASE score during their last week
Slika 4. Testiranje statističkih razlika između skupina u odnosu na sveukupan PASE uspjeh u proteklom tjednu

Discussion

The majority of elderly people practise a sitting lifestyle which is confirmed by the results of this study. They have a low physical activity evaluation in accordance to the NERI range and, at the same time, an increased BMI, which is present across all observed groups. In the results, you can find that the variables BMI and total PASE have negative correlations. These are key starting points for developing desired interventions for including elderly people and their participation in organized physical activity with a diet that is adjusted to their lowered energy needs. An individual geronto-logical biopsychosocial approach is a key method in preventing negative behaviours in people of an advanced age, and it enables timely and appropriate geriatric medical interventions.[8] A scientifically certified and integral approach to healthcare of the elderly is crucial in order to ensure all the necessary measures and procedures, as well as to enable improving all the aspects of health and social-care ranging from geroprophylaxis, diagnosing, treatments and rehabilitation (physical, psychological and social) of sick and functionally disabled older persons.[9] An interdisciplinary approach to healthcare of the elderly efficiently ensures preserving their functional ability and active and healthy aging.[10]

Despite beneficiaries of retirement homes having an organized physical activity within the frameworks of corrective gymnastics, they still have a low total PASE score in all three groups according to the results of this study. The results obtained in this study show that PASE Q does not distinguish total physical activity and sitting activity in regards to its duration between groups. In the results you can find that one elderly did not participate in the sitting activity during the examined weekend because of his medical condition. The data obtained by this research is also supported by Duraković[11] who in his work reports that only every sixth person partakes in recreational physical activity and, on average women do so twice as rarely.

Choosing the most efficient method for assessing physical activity in elderly people is the responsibility of the researcher whose choice of method must comply to criteria of preciseness and measuring economic effectiveness. There are several questionnaires developed specifically for assessing physical activity in elderly people and some of those are: APAFOP questionnaire, CHAMPS questionnaire, modified Baecke questionnaire for elderly people; PAQE questionnaire, PAR questionnaire, PASE questionnaire, Saint-Etienne questionnaire on physical activity; QAPSE questionnaire, International Questionnaire on Physical Activity; IPAQ, International Questionnaire on Physical Activity in Elderly People, IPAQ-E, OA-ESI questionnaire, Yale method of evaluating physical activity; YPAS questionnaire and Zutphen questionnaire.[12-16]

The PASE questionnaire for assessing physical activity in the said age group was used in this study. The PASE questionnaire was developed by Washburn et al., and it is based on reviewing over 40 publications, as well as the results obtained by the pilot-testing of the questionnaire.[17] PASE was developed as a short questionnaire with 10 questions used for evaluating physical activity of participants in the domains of working activities, leisure time and household chores on a weekly basis. The final result of the PASE activity is obtained by multiplying the time that a participant has spent doing an activity (hour/week) with a separate question regarding the time spent in a sitting activity that is not included in the total PASE result. According to the results of this study, there was no statistically significant differences in all three observed groups in the domain of physical activity, BMI and sitting activity.

The majority of already existing questionnaires for assessing physical activity in elderly people was developed from a perspective that is based on energy consumption (MET result) and they evaluate the activity with a certain level of intensity. The total score obtained with a questionnaire vastly depends on the points that directly refer only to activities of greater energy consumption which leads to a specific and narrow viewpoint on physical activity that elderly people partake in and that can create an effect which omits physical activity of lower intensity. Research also confirms that the time spent doing an activity of moderate or high intensity does not accurately represent the total amount of physical activity and especially so with elderly people. Moreover, sitting behaviour has emerged as a separate risk factor to health and as a factor that shows how much an elderly person is active or inactive. In most questionnaires, it is observed as a separate domain whose points are not included in ascertaining the level of physical activity.[18]

The generalization of the results obtained with this study is limited to elderly people in a metropolitan area and in order to generalize the data, studies should also include residents of rural areas. In order to question the metric characteristics of the Croatian PASE questionnaire, it is necessary to conduct the evaluation of physical activity using a pedometer or an accelerometer. It is also needed to include additional variables that will contribute to better differentiating between participants such as using medication therapy, the time passed since having established a diagnosis and frequency of medical supervision. Practical work

values are the specificity or participant sample that belong to the elderly population and who are beneficiaries of institutionalized care. Working advantages are using a quota sample which resulted in each observed category having a relatively equal number of participants.

Conclusion

In accordance with the established goals of this research, the majority of elderly people practices a sitting lifestyle with a negative correlation between BMI and total PASE questionnaire result regardless of the observed group. This research enables developing desired interventions related to promoting physical activity in elderly people, as well as guidelines for designing new methods of monitoring and measuring physical activity of the said age group. One of the strategies to achieve a healthy and active lifestyle is including elderly people in organized forms of physical activity with a goal of encouraging health. In further research, it is needed to design measuring instruments for assessing physical activity in elderly people that would enable defining limiting factors for including this age group in the investigated domain in an easy and precise way with a clearly defined procedure for calculating and interpreting results.

References

1. WHO Active Ageing: A Policy Framework; 2018. Dostupno na adresi: http://www.who.int/ageing/ publications/active_ageing/en/ (06/2018)
2. Močnik A, Neuberg M, Canjuga I. Tjelesna aktivnost starijih osoba smještenih u stacionarnim ustanovama. Technical journal 2015;9:112-19.
3. Centers for Disease Control Behavioral Risk Factor Surveillance System; Prevalence for Data: Physical Activity, Nationwide. 2007.
4. Nastavni zavod za javno zdravstvo „Dr. Andrija Štampar". Gerontološko-javnozdravstveni pokazatelji osoba starije životne dobi: Zdravstveno-statistički ljetopis grada Zagreba za 2017. Godinu, Zagreb, 2018.
5. Mišigoj–Duraković M, Sorić M, Duraković Z. Anthropometry in cardio-metabolic risk assessment. Arh Hig Rada Toksikol 2014;65:19-27.
6. The World Health Organization in the European Region. Dostupno na adresi: http://www.euro. who.int/en/about-us/organization Datum pristupa informaciji: 15.7.2019.
7. Washburn RA, Smith KW, Jette AM, Janney CA. The physical activity scale for the elderly (PASE): development and evaluation. J Clin Epidemiol 1993;46:153-62.
8. Tomasović Mrčela N, Tomek-Roksandić S, Šostar Z, i sur. Razlike između fiziološkog i bolesnog starenja – osnove za gerontološku rehabilitaciju. Fizikalna i rehabilitacijska medicina 2016;28:56-67.
9. Tomek-Roksandić S, Perko G, Mihok D, i sur. Gerontološki centri 2004.: zagrebački model uspješne prakse za starije ljude, Zagreb: Zavod za javno zdravstvo Grada Zagreba, Centar za gerontologiju, 2005.
10. Tomek-Roksandić S, Mimica N, Kušan Jukić M, i sur. Alzheimerova bolest i druge demencije: Rano otkrivanje i zaštita zdravlja. Zagreb: Medicinska naklada, 2017.
11. Duraković Z. i suradnici. Gerijatrija medicina starije dobi. C.T. Zagreb: Poslovne informacije d.o.o., 2007.
12. Welk GJ. Physical activity assessments for health-related research. Human Kinetics Publishers, Inc. 2002.
13. Washburn RA, Jette AM, Janney CA. Using age-neutral physical activity questionnaires in research with the elderly. Journal of Aging & Health 1990; 2: 341-356.
14. Bonnefoy M, Normand S, Pachiaudi C, Lacour JR, Laville M, Kostka T. Simultaneous validation of ten physical activity questionnaires in older men: A doubly labeled water study. J Am Geriatr Soc 2001; 49:28-35.
15. Richardson MT, Ochoa P, Wang MQ. Accuracy and repeatability of the Yale physical activity survey in assessing physical activity of older adults. Percept Mot Skills 2001;93:163-177.
16. Król-Zielińska M, Ciekot M. Assessing physical activity in the elderly: a comparative study of most popular questionnaires. Trends in Sport Sciences 2015;3:133-44.
17. Campbell, CM. Methods of physical activity assessment in older adults. Iowa State University Capstones, Theses and Dissertations, Iowa State University. 2012.
18. Eckert K, Lange M. Comparison of physical activity questionnaires for the elderly with the International Classification of Functioning, Disability and Health (ICF) – an analysis of content. Eckert and Lange BMC Public Health 2015;15:249.