FACTA UNIVERSITATIS
Series: **Physical Education and Sport**, Vol. 17, No 2, 2019, pp. 299 - 310
https://doi.org/10.22190/FUPES190130028I

Research article

EFFECTS OF NORDIC WALKING ON BODY COMPOSITION AND FUNCTIONAL ABILITY: A CASE STUDY

UDC 796.922.093.612:611.7-015.2
796.015.132-055.2

Jelena Ivanović[1,2], Aco Gajević[1], Ivanka Gajić[1], Dragan Atanasov[1]

[1]Faculty of Sport, University "Union Nikola Tesla", Belgrade, Serbia
[2]Serbian Institute of Sport and Sports Medicine, Belgrade, Serbia

Abstract. *The main goal of this research is to determine effect of a ten–week long programmed Nordic Walking (NW) exercise on the body composition and functional ability of a 68-year old woman. For the evaluation of body composition, the following variables were obtained using Bioelectric Impedance: Body mass, Body Mass Index, Body Fat Mass, Percentage of Body Fat Mass, and Fat Free Mass. For the evaluation of the functional capability, the UKK 2 km test was used and the following variables were followed: Maximal oxygen uptake and the Fitness index. The program was based on aerobic exercise, with the aim of adapting the body to physical exercise and training to improve muscle strength. The program consisted of a combination of NW and warm-up exercises, tightening and strengthening of the complete musculature. The results showed significant improvements in all of the studied characteristics, especially in the functional parameters. Maximal oxygen uptake and Fitness index, in the end, compared to the initial measurement, improved by almost 61% (from 17.91 ml/kg/min to 29.62 ml/kg/min) and 63% (from 68 at 109), respectively. In addition, the results showed that the trend of changes in all the studied characteristics indicated a significant increase at the level from 89.88% (for Fat free mass) to 98.73% (Fitness index). Continued application of the proposed program could contribute to the improvement of the examined variables related to body composition and functional capacity, which can result in the better health status of the target population.*

Key words: *Fitness, Body Composition, Adult, Nordic Walking*

Received January 30, 2019/ Accepted June 05, 2019
Corresponding author: Jelena Ivanović
Faculty of Sport, University "Union Nikola Tesla", St. Narodnih heroja 30/I, 11070 New Belgrade, Serbia
Phone: +381 11 4044050 • E-mail: jelena.ivanovic@rzsport.gov.rs

INTRODUCTION

Interest in sport activities has grown in recent years because of the increase in leisure time, as well as the belief that general health can be enhanced by improved physical fitness. For a variety of reasons, participation in physical activity declines with advancing age and current aging trends worldwide are unprecedented in human history (Đokić, Jovanović, & Kondrič, 2014).

Adults aged 65 and older tend to sit or lie 10 or more hours on average per day. In this way they become more prone to falls, weight gain and hearth diseases. Contrary to some prejudices, it is the body in older age that needs to be physically active more than ever in order to stay vibrant and full of energy. Based on numerous studies, in order to improve physical fitness, moderate physical activity of up to 120 minutes per week is sufficient (Anttila, Holopainen, & Jokinen, 1999; Parkatti, Wacker, & Andrews, 2002; Song, Yoo, Choi, & Kim, 2013).

Nordic Walking (NW) was originally designed as summer training for skiers, and studies soon showed that it is up to 46 percent more effective than regular walking, and that it increases calorie consumption by 20 to 45% (Evans, Potteiger, Bray, & Tuttle,1994; Rodgers, Vanheest, & Schachter, 1995; Porcari, Henrickson, Walter, Terry, & Walsko, 1997; Morss, Church, Earnest, & Jordan, 2001; Church, Earnest, & Morss, 2002; Song, Yoo, Choi, & Kim, 2013). In addition, the use of appropriate poles reduces the load on leg joints and the lumbar spine by 30 percent, increases cardiovascular and respiratory functions, and improves body posture (Parkatti et al., 2002; Mikalački, Čokorilo, & Katić, 2011). The most effective and accessible physical activity, the recreation of the new millennium, as many people call it, has been practiced by all – from children to older people. Medical research clearly confirms that NW relieves symptoms of rheumatism, migraines, arthritis and reduces the risk of osteoporosis and diabetes (Park & Kim, 2004; Kim & Roh, 2009). Spending time in the fresh air boosts the immune system, and even for those who do not like physical exercises, NW is the right choice – with minimal strain of the body, the maximal effect is achieved – all in a healthy environment.

The main goal of this research is to determine the effect of a ten-week long programmed NW exercising on the body composition and functional ability of a 68-year old woman.

METHODS

Sample of participants

The participant in this study was a woman 68 years of age, who during her lifetime had not participated in any organized physical activity, except for sporadic walks, which due to work obligations were not in continuity, especially during the last decade of life. Basic information about the participant at the start of the programmed physical exercise is shown in Table 1.

Table 1 Basic information of the participant

Gender	Age (years)	Body Height (cm)	Body Mass (kg)	Level of exercise
Female	68	169	89.5	No background of exercising

Measuring instruments

The body composition of the participant was obtained using data collected by measuring the body height and composition obtained by the application of the method of multichannel bioelectrical impedance – BIA (Tanita BC 418, Tokyo, Japan). The validity and reliability of this instrument was evaluated in previous research (Jebb, Cole, Doman, Murgatroyd, & Prentice, 2000; Pietrobelli, Rubiano, St-Onge, & Heymsfield, 2004; Kelly & Metcalfe, 2012).

As the study participant was an elderly woman where physically demanding tests are not recommended, the UKK 2-km walking test was used. Although engaging large muscle groups, this test does not belong to high-risk activities that may lead to rapid exhaustion of the body.

A standardized UKK walk test, formula to calculate the fitness index for elderly females and an equation predicting maximal aerobic power on the basis of the results of the UKK Walk Test for females were used following a previously described procedures (Oja et al., 2013).

Formula to calculate the fitness index for elderly females (Oja et al., 2013):

$$304–(8.5\text{ min}+0.14\text{ s}+0.32\text{ HR}+1.1\text{ BMI})+0.4\text{ years}$$

Table 2 Fitness class according to the fitness index (Oja et al., 2013)

Fitness index	Fitness class
< 70	Considerably below average
70 – 89	Somewhat below average
90 – 110	Average
111 – 130	Somewhat above average
> 130	Considerably above average

The equation predicting maximal aerobic power on the basis of the results of the UKK Walk Test for females (Oja et al., 2013):

$$VO_2max=116.2 – 2.98 \text{ x (time, min)} – 0.11 \text{ x (heart rate)} – 0.14 \text{ x (age)} – 0.39 \text{ x (body mass index)}.$$

The sample of variables

- For body structure estimation the following variables were used:
  - Body height – BH (in cm);
  - Body mass – BM (in kg);
  - Body Mass Index – BMI (in kg/m^2)
  - Body Fat Mass – BFM (in kg)
  - Percentage of the Body Fat Mass – PBFM (in %);
  - Fat Free Mass – FFM (in kg).

- For functional ability estimation the following variables were used:
  - Maximal oxygen uptake - VO_2max (in ml/kg/min);
  - Fitness index – FitInd.

Experimental program

The experimental program lasted 10 weeks with 3 exercise sessions per week. The day before the beginning of the exercise, initial testing was carried out, and after each second week control measurements were taken. A total of 5 measurements were performed by the end of the program. The work was based on aerobic exercise, with the aim of adaptation of the body to physical exercise and training for the improvement of muscular strength. The work consists of a combination of NW and warm-up exercises, stretching and strengthening of the complete musculature. Prior to each activity, the participant was informed about the desirable pulse rate during training. The walking exercise program was designed for the participant to be in the aerobic work zone at any moment during the training. During the walking exercise, heart rate was monitored by a pulse meter and used to determine load intensity. The program was divided into three parts distinguished by volume and intensity. High load was avoided because elderly people require a lower heart rate for aerobic exercise. The values given in the table should be met; therefore, there is no need for running when aerobic work can also be achieved by walking, which is far safer and less demanding. Optimal loading intensity is dosed at 60% to 80% of the maximal heart rate (Kukkonen-Harjula et al., 2007; Mikalački et al., 2011; Parkatti, Perttunen, & Wacker, 2012). The number thus obtained is the recommended number of heart beats per minute for safe exercise. Loading intensity determined by using the formula for maximal heart rate calculation: 220-years of age (Kukkonen-Harjula et al., 2007; Mikalački et al., 2011).

Table 3 Exercise plan according to the NW part

Weeks	1-2	3-6	7-10
Volume (min)	25-40	45-50	50-60
Intensity (heart rate)	96-104	104-112	112-120
% of maximal heart rate	63-68	68-74	74-79

Data processing

All the results were processed applying = descriptive statistics, and the tendency of change in the studied characteristics was afterwards defined by applying the method of linear regression using the general equation: $y = ab^x$. All statistic methods were processed in the Microsoft Office Excel 2007 software.

RESULTS

The results of the descriptive statistics and partial differences between the initial and final measurement in the indicators for assessing body composition and functional abilities are shown in Table 4.

Table 4 Results of descriptive statistics in relation to all measurements and differences in the studied characteristics in relation to the initial and final measurement

	Initial	III/IV week	V-VI week	VII-VIII week	Final	Difference between Initial and Final	
						%	absolute
BM (kg)	89.5	89.2	86.4	84.7	83.1	7.70	6.4
BMI (kg/m^2)	31.3	31.2	30.3	29.7	29.1	7.56	2.2
PBFM (%)	38.8	38.6	37.4	37.1	35.3	9.92	3.5
BFM (kg)	34.7	34.4	32.3	31.4	29.3	18.43	5.4
FFM (kg)	55.0	54.8	54.1	53.3	53.5	2.80	1.5
VO_2max (ml/kg/min)	17.9	20.8	26.2	28.6	29.6	60.47	11.7
FitInd	68.0	81.0	99.0	106.0	109.0	62.39	41.0

Legend: BM - Body mass, BMI - Body Mass Index, PBFM - Percentage of the Body Fat, BFM - Body Fat Mass, FFM - Fat Free Mass, VO_2max - Maximal oxygen uptake, FitInd - Fitness index

Results of the linear regression of each observed characteristic are illustrated in Figures 1-8.

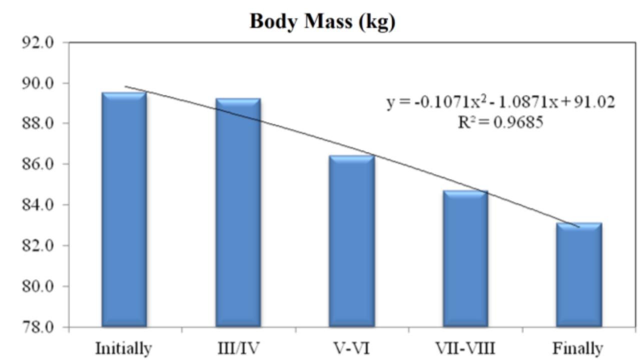

Fig. 1 A defined trend of Body Mass change

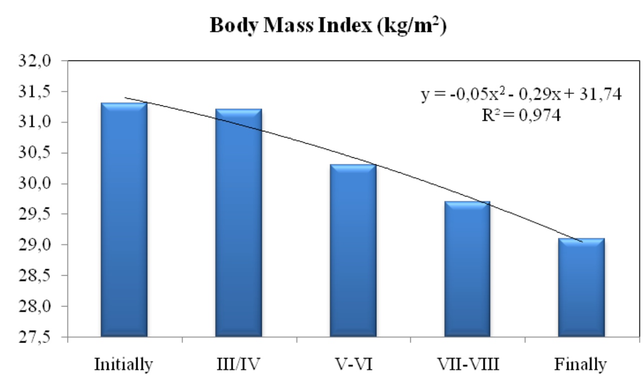

Fig. 2 A defined trend model for the changing Body Mass Index

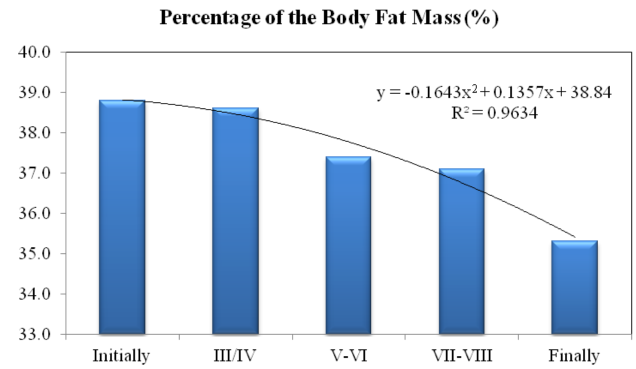

Fig. 3 A defined trend model of change in percentage of body fat

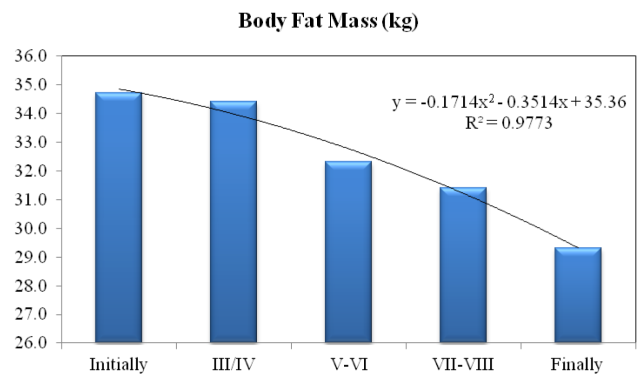

Fig. 4 Defined trend model for changes in the total amount of body fat

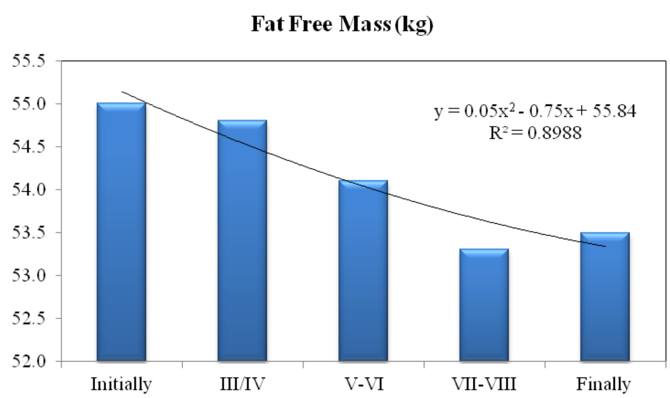

Fig. 5 Defined trend model of change of the Fat Free Mass component

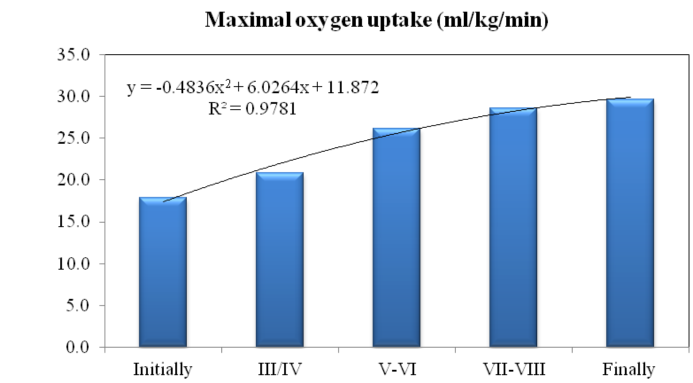

Fig. 6 Defined trend model of the change in maximal oxygen uptake

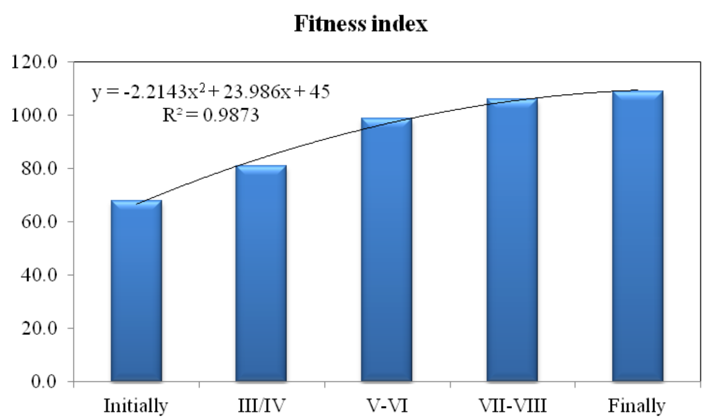

Fig. 7 Defined trend model of changes in the Fitness index

The following models of the tendency of change in the studied variables were defined:

- $y = -0.1071x^2 - 1.0871x + 91.02$, for BM, at 96.85% of probability ($R^2=0.9685$);
- $y = -0.05x^2 - 0.29x + 31.74$, for BMI, at 97.45% of probability ($R^2 = 0.9745$);
- $y = -0.1643x^2 + 0.1357x + 38.84$, for PBFM, at 96.34% of probability ($R^2 = 0.9634$);
- $y = -0.1714x^2 - 0.3514x + 35.36$, for BFM, at 97.73% of probability ($R^2 = 0.9773$);
- $y = 0.05x^2 - 0.75x + 55.84$, for FFM, at 89.88% of probability ($R^2 = 0.8988$);
- $y = -0.4836x^2 + 6.0264x + 11.872$, for VO_2max, at 97.81% of probability ($R^2 = 0.9781$);
- $y = -2.2143x^2 + 23.986x + 45$, for FitInd, at 98.73% of probability ($R^2 = 0.9873$).

DISCUSSION

The primary findings in this study indicate that the programmed ten-week exercise program based on NW contributed to:

- Total "weight loss" of 6.4 kg for a period of 10 weeks, which is the so-called "Healthy Weight Loss". The results of the study showed that the body mass has a decreasing trend in the final, in relation to the initial state (from 89.5 kg to 83.1 kg) (Table 4, Figure 1).
- Compared to the initial state, BMI values were improved by just over 7% (from 30.3 kg/m^2 to 29.1 kg/m^2). During the initial measurement, the participant was in the stage of 1st degree of obesity. At the final measurement, with a score of 29.1, the participant is in the overweight stage, according to the comparative data from the World Health Organization (which does not have a division by age groups). However, this data should be taken with a certain dose of reservation, because according to the tables of the English National Survey and the Sport Council and the Health Authority, the participant within their age group is within the scope of the recommended BMI. Some of the eminent world authors even claim that BMI values of about 28 are desirable in the so-called "Category 60+" (Table 4, Figure 2).
- The PBFM% values were improved by almost 10% (from 38.8% to 35.3%) at the final, compared to the initial measurement, which is twice as good compared to the previous measurement, and a 4.5% improvement was recorded at that time. Although the result of this value is at the upper limit, we can still place it within the framework of the average values that characterize this variable, ranging from 24% to 36% (Table 4, Figure 3).
- The BFM values were improved by about 19% (from 34.7 kg to 29.3 kg) compared to the initial measurement, and it can be concluded that the values after the implemented program are within the recommended average values (17.2 kg - 30 kg). Final testing data supports the fact that the exercise program is well designed and effectively influences the reduction of excess fats in the body (Table 4, Figure 4).
- The FFM values are within the recommended average values compared to the age and sex of the participant (Table 4, Figure 5).
- The VO_2max values were improved by almost 61% (from 17.91 ml/kg/min to 29.62 ml/kg/min) compared to the initial measurement. At the initial testing, the participant scored a result that was significantly below the average in comparison to comparative data. The VO_{2max} values obtained by the UKK 2 km test at the final measurement are in the category of values significantly above average (Table 4, Figure 7).
- The FitInd values were improved by about 63% (from 68 to 109) compared to the initial measurement. During the initial testing, the participant scored a result that was significantly below average compared to the comparative data. The FitInd values at the final measurement are within the average range (90 to 110) (Table 4, Fig. 8).

In addition, the results showed that the trend of change in all the studied characteristics has a significant increase from the level of 89.88% (for FFM) to 98.73% (FitInd), in the following code:

- BM – 1.60 kg in relation to the time period of the training cycles, on average;
- BMI – 0.55 kg/m^2 in relation to the training cycle time, on average;
- BFM – 1.35 kg in relation to the training cycle duration, on average;
- PBFM – 0.88 % of the training cycle time, on average;

- FFM – 0.38 kg in relation to the training cycle time, on average;
- VO_2max – 2.93 ml/kg/min versus time period of training cycles, on average;
- FitInd – 10.25 (index values) in relation to the time period of the training cycles, on average.

The results of this research agree with the results of previous research that NW, as opposed to normal walking, increases training loads on the body for men and women of every age and state of health (Parkatti et al., 2002; Parkatti et al., 2012; Song, Yoo, Choi, & Kim, 2013). NW improves and maintains the health of the respiratory and cardiovascular system extremely well, even at speeds slightly below those of normal walking.

Based on previous research (Walter, Porcari, Brice, & Terry, 1996; Morss et al., 2001; Parkkari et al., 2004; Kukkonen-Harjula et al., 2007), NW may be recommended to exercisers of any state of fitness, not only for its favourable effects on fitness but also because it is safe and enjoyable.

With available research that dealt with the effects of programmed NW on body composition and functional ability, it is evident that there is very little research involving participants older than 65. Previous studies mostly focused on young and middle-aged people, except for those studying the effects of NW on certain health conditions. However, there are a number of studies based on the study of the effects of this type of program and the results of these studies are quite similar to the results of the current research (Parkatti et al., 2002; Collins et al., 2003; Mikalački et al., 2011; Parkatti et al., 2012; Song et al., 2013).

Parkatti et al. (2002) studied the effects of NW and related stretching exercises on the functional ability of 18 elderly sedentary Americans (62–87 years of age) with no previous workout experience. The training program included two hour-long workout sessions a week over a 12-week period. The results of all the functional tests were statistically significantly better after training. The study showed that NW is suitable for the elderly and has a positive effect on functional capacity.

Collins et al. (2003) published a study where they studied 52 patients (65-70 years old) with peripheral vascular diseases (PVD). The program consisted of three weekly sessions of pole walking for 30-45 min. Also Vitamin E (400 IU daily dose) was studied. Pre- and post-peak oxygen uptake, Quality of Life -interview and biweekly ankle blood pressure measurements were conducted. Pole group improved exercise tolerance significantly, and the participants also experienced less claudication pain after exercise. Additionally, distance and walking speed improved in the pole groups. Researchers concluded that pole walking effectively improved both the exercise tolerance and perceived quality of life of patients with PVD. E-vitamin caused little additional benefit.

Mikalački et al. (2011) aimed to analyze the effects of experimental treatment of NW for a duration of 3 months on the functional capabilities of 60 older women (mean age 58.5±6.90 years). The training program included three workout sessions a week over a 12-week period. The results showed that NW decreased the pulse value at rest, as well as the lower and upper blood pressure, improved the fitness index values and maximum oxygen consumption.

Parkatti et al. (2012) examined the effects of an instructed structured NW exercise program on the functional capacity of older sedentary people. Volunteers were randomly assigned to an NW group (68.2 ± 3.8 yr old) or control group (69.9 ± 3.0 yr old). Before and at the end of the 9-week intervention, functional tests and 2-dimensional ground-reaction-force (GRF) patterns of normal (1.40 m/s) and fast (1.94 m/s) walking speeds were measured. The intervention included a 60-min supervised NW session on an inside track twice a week for 9 weeks. The mean changes in functional tests differed between groups significantly. Gait analyses showed no significant differences between the groups on any GRF parameters for walking speed either before or after the intervention. The study showed that NW has favorable effects on functional capacity in older people and is a suitable form of exercise for them.

However, according to the results of previous research, the training effects of NW on cardiorespiratory fitness and endurance have been shown to be similar to walking training in middle-aged and elderly women (Walter et al., 1996; Anttila et al., 1999; Morss et al., 2001; Parkkari et al., 2004; Kukkonen-Harjula et al., 2007). In the studies, the improvement in NW was reached by lower speed and thus by shorter distance walked, because the cardiovascular strain was greater in NW than in ordinary walking without poles if the same speed was used. Walking with poles improves mainly aerobic fitness, muscular endurance, decreases neck-shoulder area disabilities and pain and can have positive effects on mood.

Previous studies have shown that NW is an appropriate exercise method for older people (Kukkonen-Harjula et al., 2007) and has favorable cardiorespiratory effects (Church et al., 2002; Porcari et al., 1997).

CONCLUSIONS

In relation to the primary goal of this research, that by applying the experimental method it could be determined whether a specifically programmed ten-week exercise program for a participant aged 68 resulted in changes in body composition and functional ability, and based on the results obtained in the research, it can be concluded that the program has led to positive effects.

The results of the final measurement showed that the exercise program was adequately selected and that the loads were correctly dosed. In a relatively short period of time, a significant reduction in body mass of 6.4 kg (about 7%) and other parameters of body composition occurred. Also, for variables characterized by the level of physical preparedness, 60% (FitInd) growth was recorded of up to 70% (VO_2max). In addition, the results showed that the trend of change in all studied characteristics led to a significant increase from the level of 89.88% (for FFM) to 98.73% (FitInd).

LIMITATIONS OF THE STUDY AND FUTURE RESEARCH

For the generalization of the data to the general population, it is necessary to carry out an extensive research as soon as possible. Though in the available literature there is extremely small number of studies of the effects of programs on the body composition and functional ability of adults aged 65 and older, the results of this study should provide informative indicators that will enrich the technological process of managing, monitoring, control improvement, and optimization of the programmed exercise in the given population.

REFERENCES

Anttila, J., Holopainen, I., & Jokinen, K. (1999). *Polewalking and the effect of regular 12-week polewalking exercise on neck and shoulder symptoms, the mobility of the cervical and thoracic spine and aerobic capacity*. Final project work for the Helsinki IV (College for Health Care Professionals).

Church, T.S., Earnest, C.P., & Morss, G.M. (2002). Field testing of physiological responses associated with Nordic Walking. *Research Quarterly for Exercise and Sport, 73,* 296–300.

Collins, E., Langbein, W., Orebaugh, C., Bammert, C., Hanson, K., Reda, D., et al. (2003). Pole Striding exercise and vitamin E for management of peripheral vascular disease. *Medicine and Science in Sports and Exercise*, 3, 384-393.

Đokić, Z., Jovanović, D., & Kondrič, M. (2014). Health related physical fitness levels of elderly. *Facta Universitatis Series Physical Education and Sport*, 12(1), 19-29.

Evans, B. W., Potteiger, J. A., Bray, M. C., & Tuttle, J. L. (1994). Metabolic and hemodynamic responses to walking with hand weights in older individuals. *Medicine and Science in Sports and Exercise*, 26 (8), 1047-1052.

Jebb, S.A., Cole, T.J., Doman, D., Murgatroyd, P.R., & Prentice, A.M. (2000). Evaluation of the novel Tanita body-fat analyser to measure body composition by comparison with a four-compartment model. *British Journal of Nutrition,* 83, 115-122.

Kelly, J.S., & Metcalfe, J. (2012). Validity and reliability of body composition analysis using the Tanita BC 418 MA. *Journal of Exercise Physiology Online*, 15 (6), 74-83.

Kim, J.K., & Roh, S.K. (2009). Effect of nordic walking and aquatic exercise on oxidative stress and pain in women with degenerative arthritis. *Exercise Science*, 18 (4), 549-558.

Kukkonen-Harjula, K., Hiilloskorpi, H., Mänttäri, A., Pasanen, M., Parkkari, J., Suni, J., et al. (2007). Self-guided brisk walking training with or without poles: A randomized controlled trial in middle-aged women. *Scandinavian Journal of Medicine & Science in Sports,* 17, 316–323.

Mikalački, M., Čokorilo, N., & Katić, R. (2011). Effect of Nordic walking on functional ability and blood pressure in elderly women. *Collegium Antropologicum*, 35 (3), 889–894.

Morss, G.M., Church, T.S., Earnest, C.P., & Jordan, A.N. (2001). Field test comparing the metabolic cost of normal walking versus walking with Nordic Walking. *Medicine & Science in Sports & Exercise*, 33 (5), S23.

Oja, P., Mänttäri, A., Pokki, T., Kukkonen-Harjula, K., Laukkanen, R., Malmberg, J., et al. (2013). *UKK WALK TEST Tester's guide.* UKK Institute for Health Promotion Research.

Park, J.S., & Kim, K.J. (2004). Body composition and health related physical fitness according to abdominal fat distribution in adult women. *Journal of Exercise Nutrition and Biochemistry*, 8(1), 65-72.

Parkkari, J., Kannus, P., Natri, A., Lapinleimu, I., Palvanen, M., Heiskanen, M., et al. (2004). Active living and Injury Risk. *Internatioanal Journal of Sports Medicine*, 25, 209-216.

Parkatti, T., Wacker, P., & Andrews, N. (2002). Functional Capacity from Nordic Walking among elderly people. *Seminar poster in Congress Active Healthy Living in Elderly*. Finland: University of Jyväskylä.

Parkatti, T., Perttunen, J., & Wacker, P. (2012). Improvements in functional capacity from Nordic Walking: a randomized controlled trial among older adults. *Journal of Aging and Physical Activity,* 20, 93-105.

Pietrobelli, A., Rubiano, F., St-Onge, M.P., & Heymsfield, S.B. (2004). New bioimpedance analysis system: Improved phenotyping with whole-body analysis. *European Journal* of *Clinical Nutrition,* 58, 1479-1484.

Porcari, J.P., Henrickson, T.L., Walter, P.R., Terry, L., & Walsko, G. (1997). The physiological responses to walking with and without Power Poles on treadmill exercise. *Research Quarterly for Exercise and Sport,* 68, 161–166.

Rodgers, C.D., Vanheest, J.L., & Schachter, C.L. (1995). Exercise expenditure during submaximal walking with Exerstriders. *Medicine and Science in Sports and Exercise,* 27, 607–611.

Song, M.S., Yoo, Y.K., Choi, C.H., & Kim, N.C. (2013). Effects of Nordic Walking on body composition, muscle strength, and lipid profile in elderly women. *Asian Nursing Research*, 7, 1-7.

Walter, P.R., Porcari, J.P., Brice, G., & Terry, L. (1996). Acute responses to using walking poles in patients with coronary artery disease. *Journal of Cardiopulmonary Rehabilitation and Prevention, 16,* 245–250.

EFEKTI NORDIJSKOG HODANJA NA TELESNU KOMPOZICIJU I FUNKCIONALNE SPOSOBNOSTI: STUDIJA SLUČAJA

Osnovni cilj ovog istraživanja bio je da se utvrde efekti desetonedeljnog programiranog vežbanja (nordijsko hodanje) na telesnu kompoziciju i funkcionalne sposobnosti žene starosti 68 godina. Za procenu telesne kompozicije upotrebom bioelektrične impedanse (BIA) bile su analizirane sledeće varijable: telesna masa, indeks telesne mase (BMI), količina masti u telu, procenat masti u telu i bezmasna komponenta. Za procenu funkcionalnih sposobnosti primenom testa UKK 2 km korišćene su varijable maksimalna potrošnja kiseonika (VO2 max) i fitnes indeks (FitInd). Program je bio baziran na vežbanju aerobnog karaktera, sa ciljem da se telo ispitanice prilagodi na proces fizičkog vežbanja, kao i da se poboljša mišićna jačina. U ovu svrhu korišćena je kombinacija nordijskog hodanja (Nordic Walking) i vežbi za zagrevanje, istezanje i jačanje kompletne muskulature. Rezultati su pokazali značajna poboljšanja svih posmatranih parametara, posebno onih koji karaterišu funkcionalne sposobnosti. Vrednosti maksimalne potrošnje kiseonika i fitnes indeksa na finalnom merenju, u odnosu na inicijalno, poboljšane su skoro za 61% (sa 17.91 ml/kg/min na 29.62 ml/kg/min) za VO2 max, odnosno za 63% (sa 68 na 109) za FitInd. Rezultati linearne regresije pokazali su da je trend promena kod svih posmatranih karakteristika beležio značajno poboljšanje na nivou od 89.88% (za bezmasnu komponentu), do čak 98.73% (za fitnes indeks). Kontinuirana primena predloženog programa mogla bi doprineti poboljšanju ispitivanih varijabli vezanih za telesnu kompoziciju i funkcionalne sposobnosti, koje bi moglo rezultirati boljim zdravstvenim statusom kod ciljne populacije.

Ključne reči: *fitnes, telesna kompozicija, ordrasli, nordijsko hodanje*