

The relationship between weekly physical activity and quality of life in elderly women (pilot study)

Authors' Contribution:

A - Study Design
B - Data Collection
C - Statistical Analysis
D - Manuscript Preparation
E - Funds Collection

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Abstract

Objectives: The aim of our study was to investigate a relationship between weekly physical activity and quality of life in elderly women. **Methods:** Participants were 22 elderly women ≥ 60 years (mean age 66.27 ± 4.99) with weight ≥ 50 kg (mean weight 74.84 ± 14.87 kg) from Nitra. In this pilot study we used 2 questionnaires. The assessment of quality of life (QoL) was conducted by Short-Form General Health Survey (SF-36). To examine weekly physical activity we selected International Physical Activity Questionnaire (IPAQ). Both questionnaires were evaluated separately by standardized scoring manual for SF-36 and IPAQ. To examine a relationship between results of SF-36 and IPAQ we used non-parametric Spearman's correlation coefficient (r_s). **Results:** The results from IPAQ show significant relationship between quantity and quality of weekly physical activity and age ($r_s = -0.562$). More significant relationships were found in results from SF-36. The results showed significant relationship between domain of Vitality ($r_s = -0.508$), Social Functioning ($r_s = -0.634$), Mental Health ($r_s = -0.537$), Mental Health Summary ($r_s = -0.549$) and age. There was also significant relationship between domain of Vitality ($r_s = -0.598$), Mental Health ($r_s = -0.505$), Mental Health Summary ($r_s = -0.505$) and weight. In this study, the results did not show relationship between weekly physical activity and domains from SF-36. **Conclusions:** According to the results from both questionnaires we follow the age-related decline of weekly physical activity, vitality and mental health. In our study, questionnaires IPAQ and SF-36 did not show relationship between each other. For the further investigation we intend to use different questionnaires for elderly people or we could measure the physical activity with pedometer or other new devices which are now available on the market.

Keywords: quality of life, SF-36, IPAQ, physical activity, elderly

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INTRODUCTION

Aging is natural biological process that affects the whole human body. According to the World Health Organization in year 2050 - 20% of the World's population will be older than 60 years [4,12]. Most studies showed positive effects of regular physical activity in elderly [1,2,9,11,13,14,15,18]. From practical point of view, it is important for seniors to stay active, independent and be healthy [25]. Life factors such as unemployment, loss of a partner, restricting their social life and may lead to depression, anxiety and loneliness [7,24]. Aging particularly among postmenopausal women causes loss of muscle mass (sarcopenia), decreased metabolism activity, diabetes, obesity, osteoporosis, arthritis, incontinence, hypertension, loss of strength capabilities, loss of elasticity of muscle tissue and others [5,6,16,17,27]. A lot of studied showed, that there is a positive connection between health, Quality of Life and physical activity in elderly [7,19,26,28,29].

According to the systematic review [19] about association between physical activity and quality of life in elderly self-reported SF-36 and IPAQ questionnaires were used. Generic health survey measurement model SF-36 is designed for all patients, treatment groups and all adult population including seniors. This questionnaire (SF-36) is considered understandable and simple to fill out independently, during telephone call and together with interviewer from 5 to 10 minutes in average. The SF-36 consists of 36 questions which are divided into 8 main domains: General health (GH), Physical functioning (PF), Role limitations due to physical health (RP), Role limitations due to emotional problems (RE), Bodily pain (BP), Vitality (VT), Social functioning (SF) and Mental health (MH). Each domain contains a different number of questions:

- PF - 10 questions about common physical activity about walking, knee bend.
- RP - 4 questions about limitations during daily activities due to physical health.
- RE - 3 questions about limitations during daily activities due to emotional problems.
- BP - 2 questions about pain during the last 4 weeks.
- VT - 4 questions about energy or fatigue.
- SF - 2 questions about social life, visiting friends and relatives.
- MH - 5 questions about emotional well-being.
- GH - 5 questions about health in general.

Summary of the SF-36 domains are two scales: Physical health component summary (PF+RP+BP+GH), Mental health component summary (MH+RE+SF+VT). And the final result of the two scales (PHS and MHC) is the Index of Quality of life (QoL). The scales are scored from 0-100. Higher score means better QoL [19,21,30,33].

For evaluation regular weekly physical activity we used short form of International Physical Activity Questionnaire (IPAQ). IPAQ is the most commonly used questionnaire to examine leisure time physical activities in age range of 15-69 years. This questionnaire contains short and long form and can be filled out self-administered. The short form gathers information about the time participants spent in vigorous or moderate activities, walking or sitting during the last one week. Vigorous physical activities mean hard physical effort and much harder breathing than normal. Moderate physical activities mean moderate physical effort and somewhat harder breathing than normal. Total level of physical activity from IPAQ consists of 3 levels: low, moderate and high representing vigorous, moderate and walking activities. Low level means insufficiently active or inactive. Moderate level means sufficiently active or minimally active or:

- a) 3 or more days of vigorous activity of at least 20 minutes per day,
- b) 5 or more days of moderate-intensity activity or walking of at least 30 minutes per day,
- c) 5 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 600 MET (Metabolic equivalent)-min/week.

High level means more active category, HEPA (health-enhancing physical activity), minimum 12 500 steps per day or:

- a) Vigorous-intensity activity on at least 3 days and accumulating at least 1500 MET-minutes/week,
- b) 7 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 3000 MET-minutes/week. [19,22,31,32,33].

METHODS

Participants

Participants were 22 community-dwelling elderly women (mean age 66.27 ± 4.99 ; mean weight 74.84 ± 14.87 kg) from Nitra. Selection criteria for our study were as follows: no regular physical activity or exercise before the beginning of this experiment. Participants could have had chronic illness or obesity, but they have agreed to participate in our exercise program (strength training). Written informed consent was obtained from each participant.

Study design

For this study we used the following 2 questionnaires: SF-36 and IPAQ (Short form). Standardized forms of both were used, but we added demographic data: age, weight, education, marital status, current living (with or without relatives). The questionnaires were completed directly during the first meeting with participants.

SF-36 scoring was examined in two steps. First, we recoded answers into scales score from 0- to 100 using score key. Score for each domain was calculated as average of the questions (above-mentioned). The index of QoL represents the sum of the total score from Mental health component summary and Physical health component summary. The higher score means better QoL. [21,33]

Total score for IPAQ is calculated as median minutes per week or median MET minutes per week. For evaluation IPAQ data each activity has own MET value: 3,3 met's (walking), 4 met's (moderate activity) and 8 met's (vigorous activity). Score for activity is expressed as MET value x minutes of activity x days per week. The equation for calculating the total score is: MET-minutes/week = sum of Walking + Moderate + Vigorous MET-minutes/week (ipaq scoring). For calculation the data in our study we used IPAQ automatic report created by Andrea Di Blasio, Francesco Di Donato and Christian Mazzocco. [22,32]

Data Analysis

For statistical evaluation of significance between physical activity and SF-36 domains we used non-parametric Spearman correlation coefficient (r_s). Alpha level was set at 0.05. All statistical calculations through IBM SPSS statistics software were performed.

RESULTS

Participants of our study were divided into 3 levels according to the results from IPAQ. Low level group consisted of 4 participants (18 %). Moderate level group consisted of 8 (36 %) and high level group consisted of 10 (45 %) participants. According to SF-36 questionnaire there are 3 main domains: PHS, MHC and index SF-36. Average results (%) of our group in domains were: PHS (67 %), MHC (70 %) and index SF-36 (69 %).

Through Spearman's correlation coefficient we found significant negative relationship between age and the total physical activity from IPAQ (PA) ($r_s = -0.562$; $p < 0.05$) as well as between age and SF-36 domains. We have found following relationships between age and VT

($r_s = -0.508$; $p < 0.05$), age and SF ($r_s = -0.634$; $p < 0.05$), age and MH ($r_s = -0.508$; $p < 0.05$), age and MHC ($r_s = -0.549$; $p < 0.01$) as well as between age and index SF-36 ($r_s = -0.509$; $p < 0.05$).

We have also recorded marginally significant negative relationship between body weight and PA ($r_s = -0.396$; $p = 0.06$). There were also significant negative relationships between body weight (BW) and SF-36 domains. We have found negative relationships between BW and VT ($r_s = -0.598$; $p < 0.01$), BW and MH ($r_s = -0.505$; $p < 0.05$), BW and MHC ($r_s = -0.515$; $p < 0.05$) as well as between BW and index SF-36 ($r_s = -0.458$; $p < 0.05$).

As we mentioned above at the beginning of this section participants were divided into 3 levels (low, moderate, high). Subsequently we performed Spearman's correlation analysis to determine significant relationships between PA (above-mentioned abbreviation) and SF-36 domains. Our results indicate negative relationships between PA at low level and all domains contained in the SF-36. But significant negative relationships were found between PA-low and PF ($r_s = -1.000$; $p < 0.01$), PA-low and MH ($r_s = -1.000$; $p < 0.01$) as well as between PA-low and MHC ($r_s = -1.000$; $p < 0.01$) and PA-low and index SF-36 ($r_s = -1.000$; $p < 0.01$). Further analysis revealed no significant relationships between PA-moderate and all SF-36 domains. But when we analysed relationships between PA-high and domains of SF-36 we found significant positive relationships between PA-high and GH ($r_s = 0.817$; $p < 0.01$) as well as between PA-high and PHS ($r_s = 0.624$; $p = 0.05$). There was a trend towards to positive relationships between PA-high and other domains.

DISCUSSION

Participants in our group were divided into 3 levels (low, moderate, and high) according to the results from IPAQ. However, this is a pilot study thus it is hard to compare our results with other studies because of different number of participants. So these results are related only to our group of elderly people and must be presented with caution.

Aging of human body is natural biological process which is influenced by internal and external factors. Internal factors include for example: skeletal muscle mass loss (sarcopenia), increased adipose tissue, and arthritis, neuromuscular changes (decreased motoneurone activity, co-contraction, muscle fibre atrophy and others) [3,20,27,]. External factors include: loss of self-sufficiency, depression, anxiety, loneliness [26,29].

The results of our study are in line with previous researches where they found significant relationship between physical activity and aging [8,19,29,]. Positive effects of physical activity in elderly are connected with health-related changes as follows: cardiovascular system, hypertension, diabetes mellitus, osteoporosis, arthritis, incontinence, obesity and has antidepressant effects. Regular physical activity is also associated with a reduction in mortality [10,34].

The results of our study also demonstrate marginally significant negative relationship between PA and body weight ($p = 0.06$) and this result is closer to the study performed by Piccoli et al.[35]. Several changes in body composition are associated with aging that have direct impact on body weight, body functions and general health [23]. As above-mentioned, this is a pilot study and purpose of our future research will be find out relationship between body weight changes after intervention of regular strength training program in group of elderly women. So while, we cannot draw direct conclusions and compare our results with previous studies. We also found significant negative relationships between body weight and some of the SF-36 domains (as shown in the section results) which will be monitored and compared after completion of our strength training programme.

Further analysis revealed significantly negative relationships between PA-low and MH, MHC, index SF-36. There were inverse relationships between PA-low and other SF-36 domains, but the results were non-significant. This can be caused by reduction of daily activities for example due to: physical (eg.: suffering from back and knee pain) and mental health (eg.:

depression, loneliness) [7,19,26,29]. There was a trend towards to positive relationships between PA-moderate and each domain of QoL, but these results were non-significant. This positive trend was confirmed by group who was classified as high level group. In this group we found significant relationship between PA-high and GH ($p < 0.01$) as well as PA-high and PHS ($p = 0.05$). We have also recorded marginally significance between PA-high and SF ($p = 0.06$). Depending on the results of our study we think that increased physical activity in elderly is related to general health. They are independently persons and maintain social contact with friends and/or relatives [28].

This study has also limitations which are necessary to mention. The study contains small number of participants. To the future studies we recommend to obtain a larger number of participants. All subjects in our study were elderly women and inclusion of males would be interesting. For future study we should consider objective methods of measurements of physical activity using accelerometer, pedometer or any other new devices which are now available on the market. Another limitation for our study and potential future research is that there are no Slovak general population norms.

CONCLUSION

The results of our study indicate positive relationship between physical activity and quality of life. Higher physical activity shows better social functions, general and mental health. According to the results we recommend to incorporate regular physical activity for increase physical functions in elderly. As we mentioned this study is a pilot study and longitudinal and intervention studies are needed to assess different domains and the impact of physical activity (eg.: strength training) on this outcomes.

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