

Yoga training application in overweight control of seniors with arthritis/osteoarthritis

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Abstract:

The subject of the paper is oriented on problems of senior revitalization and joints healing. The study reports the application and evaluation of an interventional yoga program for seniors with overweight in arthritis or osteoarthritis combination. The aim of the study is to accomplish significant changes in overweight reduce, pain reduce and self-concept optimization of participants after the yoga training. The experimental group (ES) was conducted from 58 persons from senior homes in the region of South Bohemia in Czech Republic. The control group (CS) was conducted from 54 persons from senior homes in the region of South Bohemia in Czech Republic. All the probands were disabled seniors with diagnosis of overweight with arthritis or osteoarthritis. ES and CS were compared before and after intervention movement program in somatic and psychological tests, e.g. BMI, measuring of diameters of 10 skin folds with callipers, self-perception gamut, and list of open sentences. In ES a significant discrepancy between input and check out BMI was perceptible. Significant positive changes in the reduction of diameters of 10 skin folds were recorded in female and male of ES after the yoga intervention. Psychological analyses after intervention movement program document shift from anxiety to state fair, from depressive moods to vitality, from fatigue to force and energy, from confusion and uncertainties to self-respect and self-esteem. The intervention program was running in three months cycles in several groups. Whole experiment was completed in one year.

Key words: seniors, arthritis, osteoarthritis, overweight control, yoga application, self-concept.

Background of the problem

Arthritis presents dominantly a disease of the elderly people. More than 70% of individuals in North America affected by arthritis are over the age of 65. Arthritis is more common in women than men at all ages and affects all races, ethnic groups and cultures. In the United States a CDC survey based on data from 2007-2009 showed 22.2% (49.9 million) of adults aged ≥ 18 years had self-reported doctor-diagnosed arthritis, and 9.4% (21.1 million) or 42.4% of those with arthritis had arthritis-attributable activity limitation. With an aging population this number is expected to increase [1].

Arthritis and Osteoarthritis (OA) are the most common joint disorders with symptoms in the hands, knees, hips, back, and neck. It is unclear exactly how excess weight influences these sicknesses. Arthritis (from Greek *arthro-*, joint + *-itis*, inflammation) presents a joint disorder that involves inflammation of one or more joints. The most common form, osteoarthritis is a result of trauma to the joint, infection of the joint, or age. The major complaint by seniors having arthritis is joint pain. Pain is often a constant and may be localized to the joint affected. The pain from arthritis occurs due to inflammation that occurs around the joint, damage to the joint from disease, daily wear and tear of joint, muscle strains caused by forceful movements against stiff, painful joints and fatigue. Clearly, being overweight increases the load placed on the joints such as the knee,

which increases stress and could possibly hasten the breakdown of cartilage [2]. For example, it is estimated that a force of nearly three to six times one's body weight is exerted across the knee while walking; an increase in body weight increases the force by this amount [3]. However, overweight has also been associated with higher rates of hand OA in some studies [4] suggesting the involvement of a circulating systemic factor as well. Being overweight is a clear risk factor for developing OA. Population-based studies have consistently shown a link between overweight or obesity and knee OA. Estimating prevalence across populations is difficult since definitions for obesity and knee OA vary among investigators. Data from the first National Health and Nutrition Examination Survey (HANES I) indicated that obese women had nearly 4 times the risk of knee OA as compared with non-obese women; for obese men, the risk was nearly 5 times greater [5]. Other investigations, which performed repeated x-rays over time also, have found that being overweight significantly increases the risk of developing knee OA [6]. It is estimated that persons in the highest quintile of body weight have up to 10 times the risk of knee OA than those in the lowest quintile.

The investigators [7, 8] concluded that in elderly persons, if obese men (i.e., BMI greater than 30) lost enough weight to fall into the overweight category (BMI 26-29.9) and men in the overweight category lost enough weight to move into the normal weight category (BMI less than 26), knee OA would decrease by 21.5%. Similar changes in weight

category by women would result in a 33% decrease in knee OA. A handful of studies have indicated that weight loss substantially reduced reports of pain as well. Thus, weight loss potentially offers an important modifiable factor in the behavioral treatment of knee OA [9].

Health promotion in senior age is deeply wedded with the self-concept. Current views of the Self are positioning the Self as playing an integral part in human motivation to health, cognition, affect, and social identity. Self-concept in modern psychology includes social character or abilities, physical appearance, body image and thinking. Self-concept has an impact on self-esteem and self-confidence. Self-esteem can be regarded as an enduring personality characteristic (Trait Self-esteem), though normal, short-term variations (State Self-esteem) occur. The aim of Health Education is a positive behavioral modification of the Self. Education for health, motivation strategies, responsibility for own health begins with the self-esteem [10]. It hopes to motivate them with whatever interests they may have in improving their living conditions. The human nervous system is best activated by move. A motion, especially directed and controlled throughout, is of considerable therapeutic value. It shows the state of the nervous system, its inherent structure and level of development. As a psychosomatic system, yoga has a favorable influence not only on the physical side, but it favorably effects the psychical and social development of a personality, too [11].

Aim of the study

The research study aim was to develop and apply a manageable intervention yoga program for seniors with overweight in arthritis or osteoarthritis combination, to evaluate significant somatic changes in overweight control of participant seniors after the yoga program and to explore differences in tested parameters between female and male samples. The aim was oriented not only on a suitable intervention but to analyze reactions and changes of participant seniors in psychic states related to self-control and self-esteem.

Methodology

Sample description

112 volunteers – seniors in age: 69.5 ± 5.4 absolved the whole procedure of the research project – from them 43 seniors (23 males, 40 females) in the Experimental Sample (ES) and 49 seniors (20 males, 29 females) in the Control Sample (CS). The volunteers were selected for the study from senior homes in the South Bohemia region in Czech Republic. In these senior houses no regular movement activity for seniors was organized. ES and CS were selected from the same senior homes, so they lived in the same conditions, had the same daily regime, what was important for research procedure – to eliminate any variables. During the experiment only one difference was between the samples, e.g. in ES the yoga interventional program was running and realized, whereas in CS not. Seniors of the CS lived in previous “normal” conditions with minimal movement activity. Their daily activity was only sitting, lying, self-servicing (if possible).

Ethical considerations

The study was approved by the national Grant Agency of Czech Republic. Experts and the participants were informed about the purpose of the study and how data would be used. It was emphasized that participation in this study was voluntary and participants were free to withdraw at anytime. The information revealed by the participants was kept confidential and only group data were reported. The scope and objectives of the present study were explained to the subjects and their written consent was a necessary condition for participation in the research project.

Methods

Before and after the interventional program ES and CS participants were investigated in somatic and psychological tests under supervision of internists and psychologists.

A) Somatic tests:

- Body height (cm), Body weight (kg), Body Mass Index (BMI - $\text{kg}\cdot\text{m}^{-2}$) – (Scale and Altimeter SECCA 703);
- Measuring of diameters of 10 skin folds with calipers (Harpenden Skinfold Caliper)
- Ultrasonic detection of abdomen organs – lipid of liver, spleen, pancreas (Measuring technique of Internal medicine clinic was used by specialists);
- Ultrasonic detection of abdomen – diameter of abdomen fat with and without sound pressing on abdomen wall (Measuring was provided in an Internal medicine clinic by specialists);

B) Psychological tests:

- “Self-perception gamut POP” [12] observed the self-efficacy effect, self-esteem on a real (contemporary) and ideal (future) level; “Self-perception gamut POP” is a test of the perceived Physical Ability Scale. It is measuring of the relationship between physical Self-Perception on ideal and real level in 24 categories. Standardization and translation from Italian into Czech was effected in the year 1995.
- “Open sentences Questionnaire” [13] analyzed changes in values and self-esteem. This method is ranged among projective method. It includes 9 unfinished sentences and 3 wishes. Standardization and translation from English into Czech was effected in the year 1998.

Procedure

Ultrasonic detection of abdomen organs (proportion of liver, spleen, and pancreas) as well as ultrasonic detection of abdomen and diameter of abdomen fat were drawn between 7 am to 8.00 am. On this day of data collection the subjects were asked to abstain from the yogic practices. The following investigations were carried out after - high, weight, BMI, measuring of diameters of 10 skin folds. The above parameters were estimated before commencement of the study (Input Data) and in the end of intervention yoga practice (Output Data). Also psychometric input and output investigations were provide before end after intervention yoga program.

Table 1. Samples description

Sample	Number of participants	Age (mode)	Males		Females	
			ES	CS	ES	CS
Seniors	112	69.5 ± 5.4	23	20	40	29

The yoga interventional program was realized in ES groups in the trimensual coherent cycles, it means in 3 months. Once per week a meeting with lecture and a training procedure were provided. Here clients learned a block of exercises, what have to practice at home every day for one hour till the next meeting with lecture and a training procedure. Every two weeks the intervention exercise program was changed. The optimum length of the meeting with lecture was 45 minutes and of the exercise unit 90 minutes. The exercise unit consisted always from the training parts: Relaxation, Stretching, Yoga exercises – Sarvahaasanas, Yoga set, Relaxation, Breathing exercise, Concentration or Self-inquiry meditation exercise. The intervention program consisted from physical yoga exercises – yoga sets, (was used training program of simple yoga exercises – “Savahitaasanas” and asanas from the System Yoga in daily Life [14], Breathing exercises, Relaxation techniques, Concentration techniques, Self-Inquiry meditation techniques to support Self-Esteem by clients, Individualization (it means a common method in training process, individual approach to person, which is trained, to respect her individual possibilities and skills during the training process), Lectures (ethics, life philosophy, stress management, nutrition and drink regime, prevention of the difficulties respective to age specifics). The interventional yoga programs proceed in groups, 12-15 clients met in the lectures and training. All the groups were trained by one trainer. The trainer is Assoc. Prof. in Kinesiology and qualified yoga teacher with 20 years of experience in yoga application. Her license of yoga teaching qualification is international valid and on highest level in Czech Republic – yoga trainer of 1st class.

Data are expressed in basic form as mean ± SD, median, mode etc. Analysis of the results were made using Correlation coefficient evaluation, Man-Whitney method, one-way ANOVA with repeated measures and Data mining – 3 methods – classification with algorithm JRip, classification with tree J48 and selective algorithm Best First. P-values of less than < 0.05 were considered significant.

Results and Discussion

Somatic Tests Results

Before the intervention the significant differences between ES and KS in all age groups of volunteers were not found. After the intervention in ES the significant differences in weight reduce were found.

After the three months interventional program the average weight decrease about 1.8 kilograms per month in the female seniors EC and 1.7 kilograms per month in the male seniors EC were recorded. It was found out a significant difference of BMI in female seniors ES - F (2.41) = 38.799, p = 0.005. In the female seniors ES a significant difference was found out in the sum of 10 skin folds ES - F (2.41) = 39.505, p = 0.005. Positive significant fall in the reduction of diameters of 10 skin folds in male seniors EC was ascertained - F (2.41) = 51.461, p = 0.005. In male and female seniors CS any significant changes in the weight reduction,

BMI reduction and reduction of diameters of 10 skin folds in the end of the interventional period were not ascertained.

Ultrasonic investigation ascertained, that at the end of the interventional yoga program a light reducing of a left hepatic part was found and a significant reduction of the abdominal wall thickness in EC compared to CS as well - F(4.39) = 96.461, p = 0.005. The abdominal wall sickness was measured variable perhaps 3cm below navel, partly quite freely without any pressing of the ultrasonic sound and then with an expressive pressure of the sound till that already was not possible to realize a higher compression. Female seniors ES get to the end of yoga program to reducing of abdominal wall thickness below the navel. The reduction of weight significantly correlates with the abdominal wall thickness. There were also changes of spleen and liver. In ES after intervention size of spleen was discrete reduced and also liver decreased, esp. left part of liver. But the differences between ES and CS are not significant in the tests. From Figures 1 and 2 results that after intervention program the weight in ES expressively decreased. In ES Input/output was found the significant difference in weight reduce F (1, 59) = 186.54, p = 0.05., see Figure 3.

Psychological tests and changes in self- concept, self-esteem and self-control

Participants of all age groups had positive relation to yoga training e.g. to intervention program. They come to practice optionally. They exercised with interest and were grateful. The atmosphere was positive and often full of humor. The program was adapted to the possibilities of each type of groups and individuals, e.g. in the beginning of program seniors exercised on chairs and in second half of program they practiced on yoga mattes. Most frequent subject of talks with trainer was health, family and food. Very often seniors wanted talk about worries and suffer. Often topic was problematic of arthritis/osteoarthritis problematic and bad pains; above all it was discussed obesity and overweight management.

Self-perception gamut POP observed the self-efficacy effect, self-esteem on a real (contemporary) and ideal (future) level. For the ES participants yoga techniques showed a multivariate effect in the self-concept. There was a decrease which characterizes the reduction of discrepancy between self-perception and the ideal image of one’s own person. This change indicates the shift in the perception of one’s own person to self-control and stability, which leads to a common feeling of subjective contentment and “well-being”. The interventional yoga program had a positive influence in areas of higher self-esteem and positive attitude towards the surrounding world (F131 = 24.49; p = 0.001). Self – perception changes manifested in adjectives show the direction of the shift: heavy – >light, tired – >full of energy, rough – >tender, difficult – >easy. Similar positive changes heavy – >light, tired – >full of energy were caused in ES of adults and seniors. In ES of seniors “real” level – factor 1 F120 = 13.029, p = 0.001, factor 3 F120 = 5.569, p = 0.001, factor 4 F120 = 35.34, p = 0.001,

Table 2. Changes in weight, sum of 10 skin folds and BMI in ES after the intervention program

Sample	Weight reduce	Sum of 10 skin folds reduce	BMI decreasing changes
ES Female Seniors	1.8 kilograms per month	F (2.41) = 39.505 p = 0.005	F(2.41) = 38.799 p = 0.005
ES Male Seniors	1.7 kilograms per month	F(2.41) = 51.461 p = 0.005	Not significant decreasing

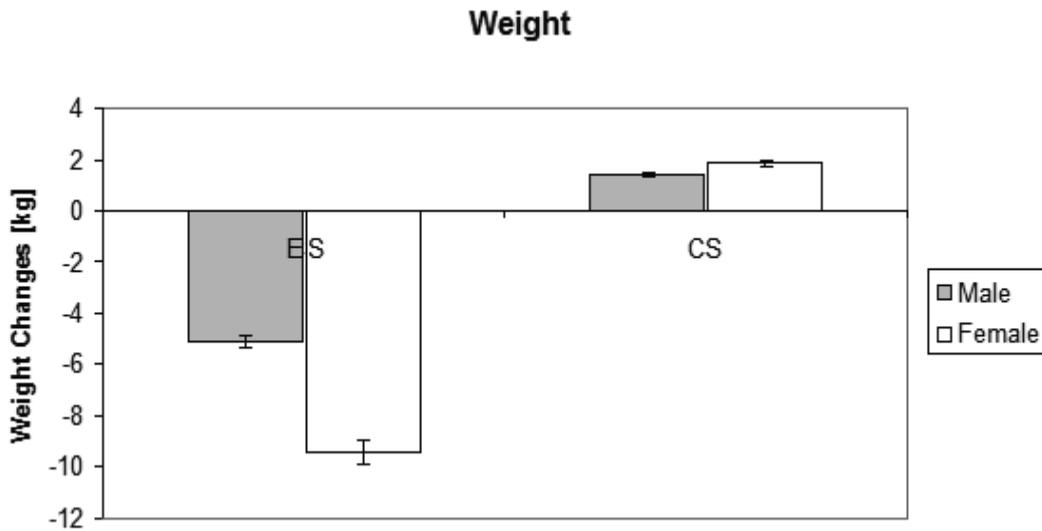


Fig. 1. Changes in weight after intervention yoga program in Male & Female Seniors (N = 112, ES = 58, CS = 54)

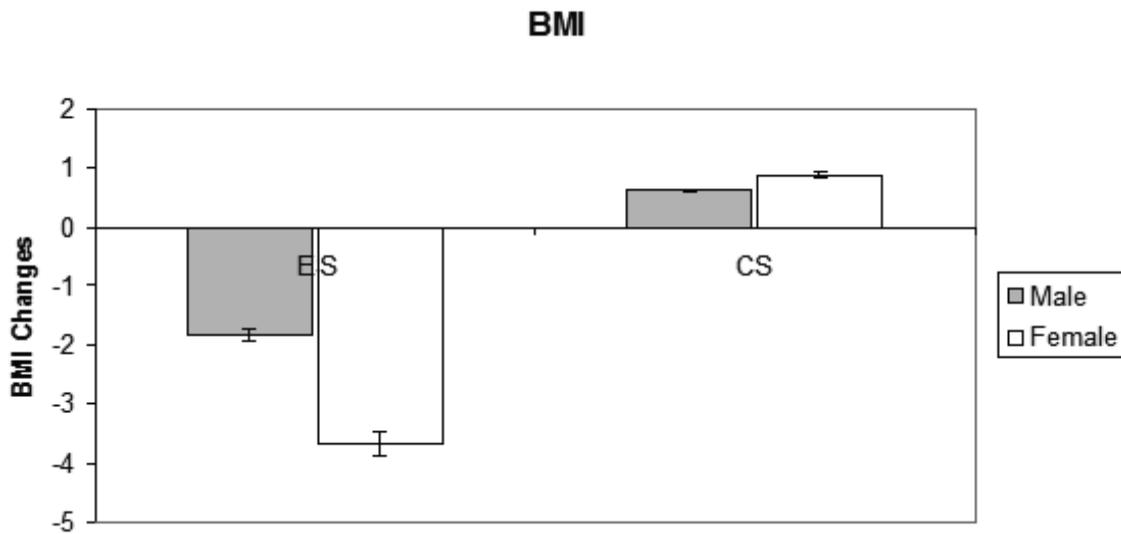


Fig. 2. Changes in BMI after intervention yoga program in Male & Female Seniors (N = 112, ES = 58, CS = 54)

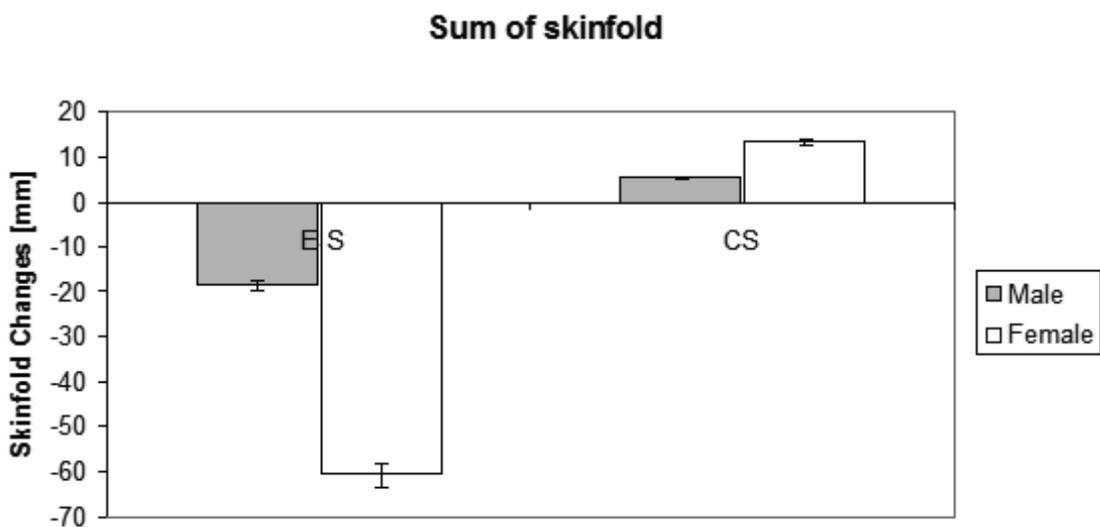


Fig. 3. Changes in Sum of Skin folds after intervention yoga program in Male & Female Seniors (N = 112, ES = 58, CS = 54)

In ES were found significant differences in gender roles. It was necessary to solve a question of the co - education in the group. Significant different attitudes were found in ES of seniors between female and male participants. Women with overweight in arthritis or osteoarthritis combination were not against the co-educative yoga training. In the opposite men preferred to practice separately in a men group only. It seems that overweight or obesity are for male seniors stressful and that they afraid of devaluation. It should be respected. After pass interventional yoga program the participants felt better in the mental state. Especially group of male seniors was after interventional program very mentally well-balanced. Interesting is, that at the beginning seniors wish be more rough, than delicate. Perhaps they thought that they are more respected in such kind of role.

Evaluation of "Open sentences" in a pivot table Man-Whitney $p = 0.05$ concludes that ES and CS seniors prefer in the life good health, peace in the world, satisfaction. Seniors reflected own life and problem of death. They discussed if life has a sense, how to live in this world. They thought much, if life, which till now they had, was correct or bad what about made badly in health context. After intervention it was documented on base of Man-Whitney $p = 0.05$ results a pregnant impact and positive influence of yoga program in ES seniors on their state of mind to piece. Among frequent wish belonged to fly by air plane and actively relax in outdoor, to go out in nature. This fact is related to decreasing of overweight and obesity, improvement flexibility bodies and tonic ability after interventional yoga program and to have open way to new sports activities, walking etc. included tendency something prove, finish, learn something new, manage something, again work in case of seniors, to continue to lose several more kilograms, but above all something prove. This fact exemplifies how the higher or renew self-esteem evokes significantly life style changes.

Discussion to the interventional yoga program

Seniors accepted the interventional yoga program very positively. Relaxation was favorable. After completion of the interventional yoga program all ES participants anonymously in written form expressed, how they liked the program. Negative standpoints to yoga exercising were not declared at all. Seniors expressed, that exercising them enrich life, that they felt better in mental, social but also in physical health. For some it was the only one possibility in week to have exercise training with expert guiding. Frequent expressions were in context of pains elimination that yoga was for seniors as a beneficial medicine, esp. in case of pains in back and joints. New experience and feelings connected with relaxation, controlled rhythm of breathing and slow motion represented a wholly new quality of motion experience for them. Positive changes were caused by a close connection and inner experience of exercises. A conscious inwardness of every motion and realization of the body part leads to the significant state improvement in a relative short period of time.

The benefits of yogic exercises on body mass showed a significant decrease in fat fold thickness is in agree with the study [15], which suggested that yoga exercises and breathing exercises cause mobilization of fat deposits. Another interesting effect presents fact that the lower weight reduce was constant in male ES compared to female ES. It can be discuss that anabolic processes supported by regular exercising of men get on faster thanks present testosterone and manifests in the growth of muscular masses. Such results are very positive. These changes are desirable. A preservation and growth of the muscular masses in older age has a great importance for the condition. Very interesting changes were found in

stretching effects and corrective impulses on the body of participants during yoga training. It correlates with participants subjective feelings of comfort after training because spine cord was stretched, fixed and relaxed. According to results of gamut POP, all participants in senior age would like to be bodily and mentally fit. Seniors in ES did not have after the intervention yoga program problems with regulation of their breath and strove breathe deeply and avoid superficial breathing.

In "Open sentences" participants declared problem of adherence on eating. Night eating syndrome is characterized with stress and with poor results at attempts to lose weight. Mastering in relaxation on different levels is an important part of overweight management. The results of study [16] indicated that 20 min of a muscle relaxation exercise significantly reduced stress, anxiety and after practicing these exercises daily for a week, subjects exhibited lowered stress, anxiety, fatigue, anger, and depression, ratings of hunger, and a trend for breakfast taking and less night-time eating.

Participants expressed also that they found friends in yoga training and that it fact helped them much. Exercises should be motivating. This strategy was the main point of proposed research. Lone knowledge how to take care about health is not very much effective [17]. Much more perspective is to force of self-efficacy and self-respect and independence of people. The postulate is here the statement that only the man, who respects Self, can be really motivated to do something useful for own health.

Very specify in yoga training were corrections of movement stereotypes and synchrony of breath and movement. Yoga movement is relaxed, slow, conscious controlled, coordinated with breathing process. Improving of elasticity and presumed and tested support of metabolic and endocrinology system is benefit for healing of overweight. From this view we can speak about re-educative effect of yoga exercises on body structure. System of breathing exercises improves cardiopulmonary capacity, improves of tissue aerobic saturation and hypoxia adaptability of tissues. It results in improvement of venous recovery, establishment of correct breath rhythm and in reduction of body and mental tension [18].

Conclusions

From the results of male and female ES and CS the significant discrepancy between input and check out BMI is perceptible, in case of CS not. In female ES results show a higher fall of the BMI then in male ES. The significant positive changes in the reduction of diameters of 10 skin folds were recorded in female and male in the experimental sample of seniors.

In the ES it was found the lower weight reducing and BMI decreasing compared to female ES. It can be suggested that anabolic processes supported by regular exercising of men get on faster thanks present testosterone and will manifest in the growth muscular masses in male ES.

After the interventional yoga program realization ES participants were able to practice individually the compensatory and relaxation techniques to negotiation mental fatigue and stress in their everyday life. In the interventional yoga program is recommended to practice 40-60 minutes every day (the average decrease of weight was about 1.5-3 kg. monthly) and to improve general condition. Positive changes in emotional state and regulation in sense of self-control and self - esteem improvement are significantly documented. On the basis of mentioned results can be concluded that interventional yoga program is suitable form of practicing for senior's application in overweight control with arthritis/osteoarthritis combination.

Findings of study declare that after interventional yoga program and relaxation development were analyzed deepen knowledge in the area of healthy life style in a connection of arthritis or osteoarthritis combination and value orientation of seniors. After interventional yoga training program and relaxation development in ES were found positive changes in opinions and attitudes in meanings interpersonal characteristics of self-efficacy, self-control and self-esteem. Analyses of results brought significant changes in negative emotive factors of gamut POP, as is shift from anxiety to state fair, from depressive moods to vitality, from wrathfulness to humility, from fatigue to force and energy, from confusion and uncer-

tainties to assured and self-respect. On the base of presented results yoga training can be recommended as a very useful method improving self-control, self-esteem and mental condition generally in overweight control, especially in seniors with arthritis/osteoarthritis problems.

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