

JUSTIFICATION REVITALIZING BODY OF PERSONS "THIRD AGE" BY MEANS OF PHYSICAL EDUCATION

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Annotation. *Purpose:* based on sound theoretical analysis and empirical results explain the feasibility of application of physical education for slowing the aging process people "third age". *Material:* the study included men and women 50 and 60 years, with different rates of aging and indifferent attitude toward physical activity. *Results:* revealed that the highest number of examinees is aging rapidly accelerated pace. Determined directly proportional relationship between the rate of aging and functionality of the body examined. Established the dominance of biological markers of cardiovascular and respiratory systems in the determination of the aging process of the human body. *Conclusions:* we recommend the use of exercise for the revitalization of biological aging changes individuals «third age».

Keywords: *aging, biological age, revitalization, anti-aging, face the third age.*

Introduction

Problem of rehabilitation (from Latin re- renewal and vita – life), anti-ageing, rejuvenation, longevity is rather urgent in our country. Recent years, population's health in Ukraine has been causes troubling [14]. Our country holds surely the last place in Europe by life span. Sharp increasing of age people for recent time caused demand in more profound research of this social group in different aspects: bio-medical, psychological, gerontologic, social, economic and other [9].

Main reason of such status is diseases of cardio-vascular system, diabetes, obesity, especially of aged persons, which are conditioned by style of life. For example, as per data of WHPO, human health depends on medicine only by 10-15%, on genetic factors – by 15-20%, on environmental factors – by 20-25% and on 50-55% on conditions of life [5,11,12].

One of main reasons of functional disorders in organism and of too early ageing is insufficient motion functioning. Inactive way of life first of all results in changes in cardio-vascular and respiratory systems, which, with ageing, are one of the weakest links of organism [5,13].

It is known that physical functioning in elder age positively influences both on whole organism and on its separate systems. Such functioning gives good self feeling, removes some health troubles, permits to look younger, to increase own workability, postpone helplessness.

In 90-s og 20th century there appeared and started to develop new sector of medical science – anti-ageing. It is interesting that anti-ageing, in contrast to, for example, gerontology, which deals with treatment of aged people and extension of their life span, is oriented on prophylaxis of diseases, application of methodic, which slower ageing processes in order for a person to be young as long as possible, to feel good and to be full of energy, to have full fledged life [6].

As on today medial science offer the whole arsenal of methods for extension of human life span – the so-called gero-protectors. Possibility to prolong life span was experimentally proved for anti-oxidants, lathyritics, adaptogens, neurothrops, glucocorticoids, sex hormones, hormones of growth, melatonin, immune-simulators and mimetic [7]. However, application of medical means is limited in connection with weakening of liver's and kidneys' functioning, poly-morbid states, frequent allergies and complications after medicals. Besides, in opinion of many specialists there is no chemical gero-protector with undoubtedly proved positive effect. In this connection non-medical geriatric methods, based on using of organism's internal potentials or environmental factors shall be paid attention to [11,12].

That is why, problem of searching of effective ways to increasing and preservation of motion functioning of "third age" persons is rather urgent and acute as well as improvement of such persons' physical fitness with the help of physical culture means.

Purpose, tasks of the work, material and methods

The purpose is to ground, on the base theoretical and empiric material, purposefulness of application of physical education means for slowing of organism's ageing processes of "third age" persons.

The methods of the research: analysis, synthesis, anthropometry, functional tests (test by Shtange, test by Gnechy, VCL, static balancing, BP), method of determination of biological; age by V.P. Voytenko.

Results of the research

Age changes in organism are a reason of worsening of physical condition and mental state of aged persons, increasing of disabled among them and solitary persons, who need assistance.

Ageing of every person is individual and is characterized from qualitative point of view by type of ageing, from quantitative – by speed of ageing and from point of view of ageing structure – by correlation of ageing temps of different organism's systems, i.e. by ageing profile [7].

Knowing reasons, mechanisms and main directions of human functional changes it is possible to offer methods of correction of ageing processes.

In opinion of some authors fight with ageing shall be oriented on the following:

1. Reduction of harmful factors' after-effects (stresses, unfavorable environment);
2. Stimulation of organism for repairing mechanisms and mechanisms of cells recreation;
3. Slowing of metabolism processes (diets, fast).

Considering impossibility of compete stopping of negative factors' influence or significant slowing of metabolism it is necessary to maximally stimulate organism's repairing systems. For this purpose the following measures are offered [7]:

1. Increasing of organism's immune potentials;
2. Application of medical preparations;
3. Physical exercises.

For diagnostic of human individual health it is necessary to have integral criteria for its evaluation. One of such criteria is temp of biological ageing. It is known that by determining of biological age it is possible to evaluate the temp of ageing.

All known, as on to day, methods of determination of biological age do not permit to measure the degree of molecular-genetic "wear out", caused by worsening of human organism's functions, while distinctions between conditions and way of life of different population strata vague correlations between markers of ageing and life potential. And nevertheless, even with such restrictions biological age remains one of the most confident indicators of human life potential [8].

Human biological age, its composition can be purposefully corrected in order to change temps of human ageing both by medical means and with the help of physical culture.

It is impossible to avoid ageing but it is possible to slow down its temps, to make life active in this period. It has been proved that deficit of muscular functioning – hypodynamia – forces involution changes in organism And in complex with other factors results in too early, pathological ageing. That is why physical exercises, forces of nature, hardening, rational diet, labor and rest, which support optimal functioning of organism's main systems, are effective means of prevention from too early ageing and continuation of human labor functioning.

Physical activity is one of the best health related means for aged people. It is known that regular physical loads are required in case of cardio-vascular diseases, osteo-arthritis, osteoporosis, hypertension and etc. [7,15].

Ageing processes are accompanied by changes in many systems and organs of aged persons that to large extent reflects in their motion functioning.

Physical trainings for aged persons are oriented on solution of the following tasks:

- Strengthening of health, counteraction to involution processes, preservation of general and physical workability, prolongation of active life span;
- Stimulation of compensatory-adaptation responses to environmental factors' influence, raising of general tonus and organism's hardening;
- Prophylaxis of diseases or prevention from their progressing, support of central nervous, cardio-vascular and respiratory systems' functioning, stimulation of metabolism;
- Strengthening of muscles, improvement of joints and backbone mobility, support of motion skills, correct posture;
- Forming of demand in systemic of physical trainings, acquiring of theoretical knowledge and practical skills in independent realization of the knowledge and self-control.

We tested 152 persons of 50-60 years old age (79 men and 73 women), who were relatively healthy but indifferent to motion functioning.

Measuring of biological age was carried out as per method of V.P. Voytenko (2001), which included "battery of tests" of different complexity. Logical schema of ageing evaluation of consisted of the following stages:

1. We measured biological age (BA) for a certain individual by clinic-physiological indicators. For determination of BA we used the following formulas:

Men:

$$BA=44.3+0.68 \times SET+0.40 \times SBP-0.22 \times DBP-0.004 \times VCL-0.11 \times BPin+0.08 \times BPex-0.13 \times SB$$

Women:

$$BA=17.4+0.82 \times SET+0.005 \times SBP+0.016 \times DBP+0.35 \times PBP-0.004 \times VCL+0.04 \times BPin-0.06 \times BPex-0.11 \times SB$$

Where: SET – subjective evaluation of health by the tested (with the help of questionnaire, consisting of 29 questions)

SBP – systolic blood pressure, mm.merc.col.

DBP – diastolic blood pressure, mm.merc.col.

PBP – pulse blood pressure, mm.merc.col.

VCL – vital capacity of lungs, ml.

BPin – breathing pause after inhale.

BPex – breathing pause after exhale.

SB- static balancing, sec.

We calculated proper biological age (PBA) of individual by his (her) calendar age (CA). For determination of PBA we used the following formulas:

Men:

$$PBA=0.661 \times CA + 16.9$$

Women:

$$PBA=0.629 \times CA + 15.3$$

Having calculated index (BA-PBA) we determined by how many years the tested in ahead of his (her) peers in expressiveness of ageing or by what value he (she) lags behind.

From these tests we noticed clear trend to significant increasing of quantity of the tested men and women in group with accelerated ageing (59% of men and 49.3% of women). Sharply accelerated temp of ageing was registered in 16% of men and 13.7% of women. The least numerous was group with physiologically normal (8% of men and 15.1% of women), delayed (14% of men and 16.4% of women) and dramatically slow temp of ageing (3% of men and 5.5% of women) (see fig.1).

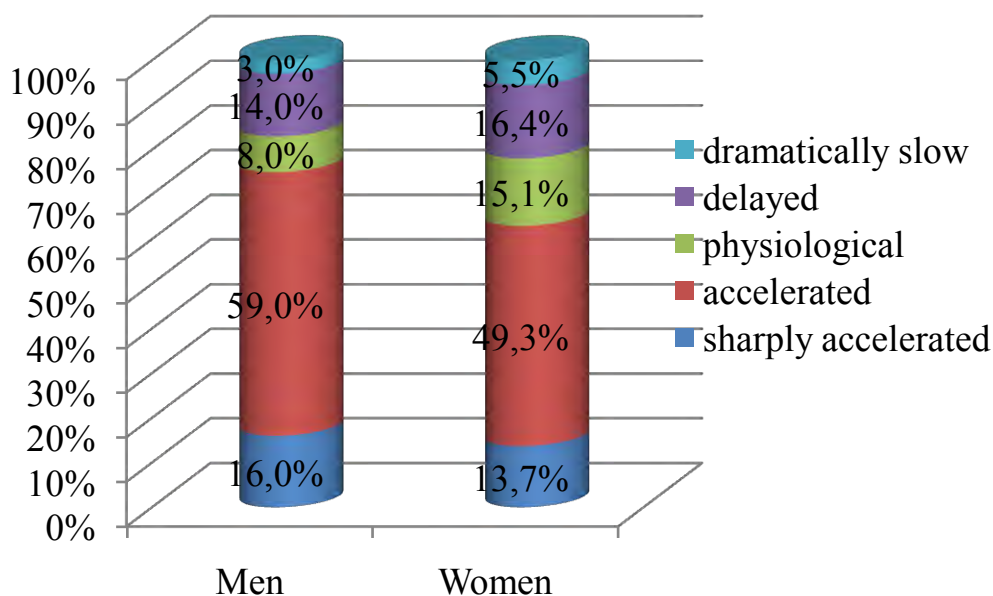


Fig.1. Temp of ageing of 50-60 years old men and women

By quantitative indicators of cardio-vascular system we observed reverse dependence on ageing temp (see table 1). I.e. increasing of BP happens with acceleration of ageing temp ($p < 0.05$).

As it is known in big arteries, with ageing, sclerotic thickening of wall tissue happens as well as atrophy of muscular lining, reduction of vessels' elasticity. As per the data of some researchers elasticity of big arteries of 70 years old persons reduces two times, comparing with 20 years old persons [7]. Such loss of elasticity results in overconsumption of energy by heart for overcoming vessels' resistance and in increasing of BP in aorta.

Table 1

Parameters of respiratory system's functional potentials and static balancing of 50-60 years old persons with different temp of ageing

Sex	Quantity n=152	Breathing pause at inhale (BP _{in}), sec	Breathing pause at exhale (BP _{ex}), sec	VCL ml	Static balancing (SB), sec.
<i>Dramatically accelerated temp of ageing</i>					
men	13	43.8±4	21.2±3	2830±262*	15.5±12*
women	10	34.8±0.4	15.6±2	1490±31,6*	3.5±1*
<i>Accelerated temp of ageing</i>					
men	47	43.3±5	21.9±4	3327±219*	36.4*
women	36	35.6±3	17.2±2	2111±261*	5.5±3
<i>Physiological temp of ageing</i>					

men	6	40.3±6	20.7±3	3550±54	55.8±9
women	11	35.4±2	18.5±4	2436±120	10.6±11
<i>Delayed temp of ageing</i>					
men	11	39.5±4	21±3*	3963±80	79±10*
women	12	39.8±4	18.6±3*	2600±241*	13.1±12
<i>Dramatically slow temp of ageing</i>					
men	2	44.5±4	32±4*	4150±495	112.5±10
women	4	37.2±5	18±3	3125±95*	11.7±9

Notes: * – confident difference by similar indicators of physiological ageing $p < 0,05$).

Basing on change of quantitative parameters of respiratory system's functioning, we determined that with increasing of ageing temp both of men and women there happen reducing of indicators, which characterize maximal productivity of energy supply system of physical workability. It is reflected in decreasing of parameters of breathing pause at inhale (BP_{in}), at exhale (BP_{ex}) and vital capacity of lungs (VCL) ($p < 0,05$). Accordingly organism's functional adaptation potentials reduce, which play great role in determination of involution processes (see table 2).

Table 2

BP values and subjective evaluations of 50-60 years persons' health with different ageing temps

Sex	Quantity n=152	Subjective evaluation of tested (SET)	Systolic BP (SBP), mm.merc.col.	Diastolic BP (DBP), mm.merc.col.	Pulse BP (PBP), mm.merc.col.
<i>Dramatically accelerated temp of ageing</i>					
men	13	6.8±2*	125.5±7	85.1±5	40.5±6
women	10	13.2±2*	143.8±4*	84.1±5*	60±7
<i>Accelerated temp of ageing</i>					
men	47	4.4±1	127.8±6*	85.1±5	42.7±6
women	36	11.1±2	140.5±3	79±5	62±5
<i>Physiological temp of ageing</i>					
men	6	4±0.6	122.5±2	82.5±2	40±3
women	11	10.3±2	139.4±3	77.9±5	61±6
<i>Delayed temp of ageing</i>					
men	11	4.6±0.8*	120.5±5	80.5±10	40±5
women	12	6.9±2*	135.4±6	76.8±6	59,6
<i>Dramatically slow temp of ageing</i>					
men	2	1.5±0.7*	115±7	70±14	45±7
women	4	5.2±1*	127.5±6*	79.5±4	48±8*

Notes: * – confident difference by similar indicators of physiological ageing $p < 0,05$).

Changes in respiratory system of aged persons are connected with structural changes of external breathing system. Rib gristles loose elasticity, connection of ribs with vertebrae reduce mobility, atrophy of inter-ribs' muscles and diaphragm, which participate in breathing, takes place. It results in decreasing of chest's and diaphragm's excursion and is accompanied by worsening of indicators of breathing. Such changes in respiratory system reduce VCL, time of breathing pause at inhale and exhale, breathing volume and etc.

Conclusions:

We have determined that physical culture as a mean of non-medical influence is one of the most effective method of prevention from weakening of organism's adaptation potential, progressing of pre-morbid state and prevention from too early ageing.

We have revealed that for main quantity of the tested men (59%) and women (49.3%) accelerated (pathological ageing was characteristic. It witnesses about purposefulness and need in revitalizing of aged persons' organisms.

The obtained values of functional potentials of respiratory, cardio-vascular systems, of static balancing and health subjective evaluation by the tested are in direct dependence on ageing temp. It witnesses about one of key roles of human physical fitness in limitation of ageing processers.

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Cite this article as: Mytskan B.M., Fedynyak N.V. Justification revitalizing body of persons «third age» by means of physical education. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 2014, vol.10, pp. 18-23. doi:10.5281/zenodo.10485

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Received: 10.04.2014

Published: 05.05.2014