

## METHODS OF APPROACH OF THE HYDROAEROBIC PROGRAM SESSIONS CONSTRUCTION FOR THE OF STUDENTS HIGHER EDUCATIONAL ESTABLISHMENTS

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The article deals with investigation of the motives of the hydroaerobic sessions of the first, second year students by means of distribution. Taking into account the motives of students, two programs of hydroaerobic sessions were proposed (traditional type and alternative approach).

## FITNESS AMONG ELDERLY PEOPLE IN AN INDIVIDUAL RESEARCH"

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### **Abstract**

The aim of this study is to evaluate the structure of bone tissue, fitness, balance and stability of posture among aged people. The tests have been performed on 147 women, aged 60 - 85 years (mean, 69 years), students of the Wrocław University of the Third Age. We examined the structure of bone tissue in the nearer base of a femur among 147 women. The tests were conducted on LUNAR DPX - PLUS by means of dual energy X-ray absorptiometry. Fitness of the examined 50 women was measured by means of an American obstacle track. The track consisted of 12 obstacles, with the total length of 104 metres. The performance at each station was evaluated according to time and quality. The maintenance of posture stability was measured on 98 people by means of a posture-graph, which was recording the projection translocation of the centre of gravity onto the plane of the base XY. Of the 147 examined women, only 20% showed osteoporosis, 55% - osteopenia, and in 25% - a negative result in osteoporosis was obtained. This can be evidence of small involutionary changes in the structure and strength of bone tissue. The obstacle race was positively finished by all participants. The average quality result was 32.8 points in total 36. No radical functional changes were noticed in posture examinations. We only observed translocation of the centre of gravity together with the body lean forward in 40% of the examined. The presented results of the total research indicate profound influence of physical activity and lifestyle on physiological mechanisms which give ability to move and keep posture, diminishing a risk of falls and fractures.

### **Introduction**

Changes occurring in different systems of an ageing organism inevitably lead to involution of motor functions. However, this process is not the same for all people. An active participation in physical exercise, even of elderly people, slows down the retardation of motor features, while

activity only accelerates these processes. Thus a retirement should be the time when a person tries to keep fit in order to maintain good physical condition, the longest possible and on the highest possible level. Psychophysical stimulation, apart from improving quality of life of aged people and providing conditions for good ageing, is the primary purpose of Universities of the Third Age, organisations vital for propagating gerontological prophylaxis. ( 1,2,,3,4,5 )

Age (yrs)	60-85	mean, 69
Height (cm)	148-168	mean, 157,4
Weight (kg)	45-90	mean, 64,7
Work span (yrs)	22-40	mean, 33
Retirement span (yrs)	2-23	mean, 10,5
Years in UTW (yrs)	2-20	mean, 5
Marital status	42%-married, 42%-widowed, 16%-single	
Lifestyle	26%-very active, 62%-active, 12%-rather active	
Physical activity	80%-organised forms of activity	

### The research methods

#### FITNESS OF THE EXAMINED

The tests were performed on 50 patients from UTW. Fitness was measured by means of the American obstacle track created in 1996, which had been slightly modified. The track consisted of 12 obstacles, with the total length of 104 metres. Each of 12 stations, while simulating ordinary activities or real-life obstacles, which a person comes across at home and in the surroundings, was to provoke physiological mechanisms responsible for ability to move and keep balance or to reveal pathological reactions disabling these skills.

#### BALANCE AND STABILITY OF POSTURE

The research material consisted of 102 people. Posturegraphic tests evaluating the shift (translation) of the centre of gravity in the projection onto the plane of base XY were performed on a posture-graph platform supported in corners on strain gauges. A standard set of tests included three 32-second recordings of deflection with eyes open. An evaluation of ability of keeping balance in a standing position was done on the basis of a morphologic-analytical analysis of the statiokinesigram. The set of parameters contained:

1. the average deflection of the radius from the centre of the coordinate system (mm),
2. the developed area of the statiokinesigram (mm<sup>2</sup>),
3. the length of the statiokinesigram (mm)
4. the average velocity of the shift of the centre of gravity in the statiokinesigram (mm/s),
5. the percentage of frequency occurrence of the projection of the centre of gravity in various quarters of the coordinate system.

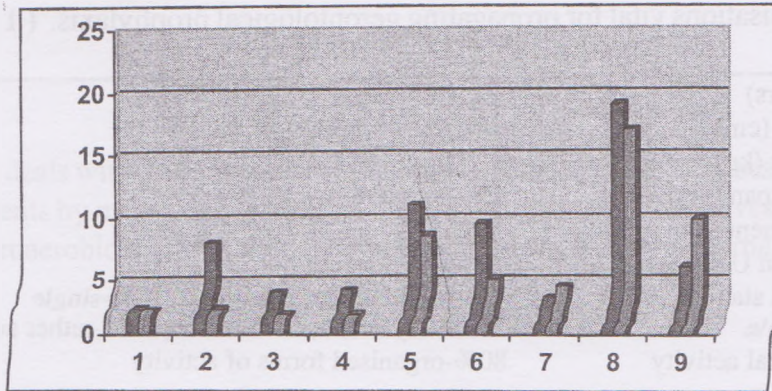
#### examinations of the structure of bone tissue

The tests were performed on 147 women from UTW. They were conducted on LUNAR DPX-PLUS by means of dual energy X- ray absorptiometry (DEXA). This method is characterised by high repeatability (2%) and accuracy (5%), which gives it a leading position among methods controlling density of bone tissue. As among elderly people, after 65 years of age osteoporosis dominates, we examined density of bone tissue in three areas: in the neck of the femur, in the Ward triangle and in the trochanter.

#### Results

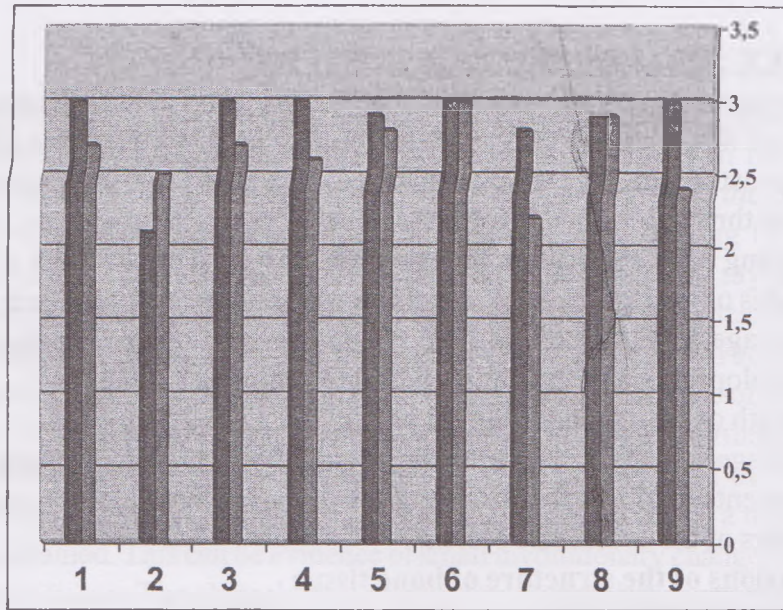
The results of the test have provided detailed information about fitness of the examined. Performance at each station was evaluated according to time (Table I) and quality (Table II). Using the American obstacle track as a model, the same criteria for scoring a range of

difficulty were established in the obstacle test (from 0 points for disability to cover a station by oneself to 3 points for a faultless, individually performed task). The maximum score was 36 points (12 x 3). The obtained results have been compared to the ones of elderly people tested in the USA.



■ AVERAGE TIME OF THE EXAMINED IN THE USA (sek)  
 ■ AVERAGE TIME OF THE EXAMINED FROM UTW IN WROCLAW (s)

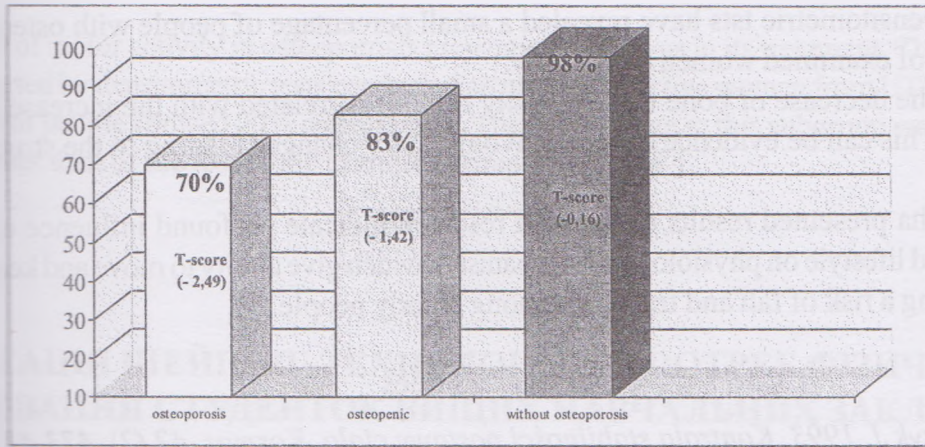
Table I. a comparison of average time in the usa and utw for 9 similar obstacles



■ AVERAGE QUALITY SCORE IN THE USA  
 ■ AVERAGE QUALITY SCORE OF UTW IN WROCLAW

Table II. a comparison of average quality score in the usa and utw for 9 similar obstacles

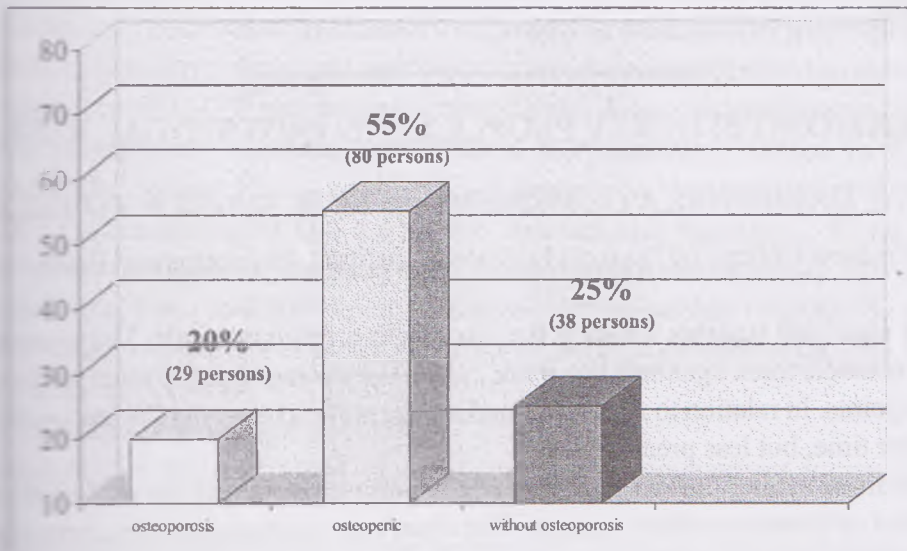
A comparative analysis comprised parameters of older people (a research group) and young people (a control group). In a standing position the projection of the centre of gravity onto the base of the support shifts drawing a curve. Thus statiokinesigram parameters obtained in the research become a pattern and an indication of balance and stability of the examined people.



*Table III. results of densitometric studies (1,2,5)*

Of the 147 examined people (age mean 69):

1. 29 people (20%) showed osteoporosis. The age average in this subgroup was 69, the average percentage of value of bone peak mass equalled 70%, which made T-score (-2,49).
2. 80 people (55%) showed osteopenia. The age average was 69, the average percentage of value of bone peak mass equalled 83%, which makes T-score (-1,42).
3. 38 people (25%) - a negative result in osteoporosis was obtained. The age average was 69, the average percentage of value of bone peak mass equalled 98%, which makes T-score (-0,16). (Table III. IV)



*Table IV. average percentage of bone peak mass*

### Conclusion

- 1) The results obtained in the research point to a high level of fitness of the patients from Złoty Stok. As the examined consisted of a "selected group (physically active and fully independent), hence the achieved result cannot be related to fitness among all aged people.
- 2) The shift of the centre of gravity forward together with a lean of the posture forward has been indicated in 38% of the examined, as result of senile degradation of a back margin of stability.
- 3) Among physically active aged people we do not observe disorders of balance and stability in a standing position, evaluated by means of posturegraphic tests.

4/ Densitometric tests have revealed a small percentage of people with osteoporosis in the group of examined women from UTW.

5/ The decrease of bone tissue density has not correlated with the increase of the age average. This can be evidence of small involutory changes relating to the structure bone tissue.

6/ The presented results of the total research indicate profound influence of physical activity and lifestyle on physiological mechanisms which give ability to move and keep posture, diminishing a risk of fall and fractures among elderly people.

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All the examined patients finished the track with a positive result. The average time of covering the obstacle track equalled 124,6 sek., while the average quality score achieved a high value of 32,8 points. In relation to American studies, the participants in UTW have performed the test in a shorter time, but less precisely. (4)

As a result of ageing processes, a lean of the body forward and the shift of the centre of gravity forward can be seen in elderly people. The observed occurrence of the centre of gravity in Cartesian quarters of the coordinate system revealed a lean of the body forward and the shift of the centre of gravity forward in 39 aged people (38%) of the research group. In the group with young people this feature was noticed in 27 examined (26%). (Table V)

Stability of posture evaluated by means of statiokinesigram parameters shows slight differences comparing to the young people. (tables VI, VII, VIII, XI). Regular physical activity of the elderly people positively influences a state of balance and stability of the body in a standing position. Sway movements are subtle in most cases. We have not observed an increase in number of shifts of the centre of gravity in the projection onto the plane of the base.

Ageing of the society, a reduction of physical activity and an influence of numerous risk factors increase the danger of formation of osteoporosis. Density of bone tissue and consequently its strength decrease with age. A number of studies on the influence of skeleton loading on its microarchitecture, mineralization, quality parameters e.g. bone peak mass, show tremendous

importance of motor activity in osteoporosis prevention as well as in its treatment. This has also been supported by densitometric tests conducted on physically active women from UTW. A small percentage of people showed 20% osteoporosis. The age average in this subgroup was 69 and it was higher than of the rest of the examined group. ( 1,2,3,4,5 )

## АДАПТАЦІЯ ШЕЙПІНГ-ТЕХНОЛОГІЙ ДО ПОТРЕБ ФІЗИЧНОГО ВИХОВАННЯ СТУДЕНТОК ВИЩИХ НАВЧАЛЬНИХ ЗАКЛАДІВ

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**Актуальність.** В численних працях [1, 2, 4, 5, 7 та інші] і наших попередніх дослідженнях [3, 6] показано, що у фізичному вихованні студентів існує низка невирішених проблем. Однією з них є недостатність і нестабільність інтересів та потреб студентів у вихованні цінностей фізичної культури [2, 4, 5, 7] і, як наслідок, низький рівень їх активності на заняттях з фізичного виховання. Наші дослідження показали, що заняття фізичного виховання з застосуванням класичних програм шейпінг-тренування („шейпінг-класік“) позитивно впливають на розвиток швидкісних якостей і гнучкості, змінюють свою структуру та змістом, сприяють розширенню знань про фізичну культуру особистості [6]. У той же час встановлено, що вони недостатньо впливають на розвиток швидкісно – силових якостей та витривалості. Окрім того, програма „шейпінг-класік“ триває 55 хв., а заняття з фізичного виховання у вищих навчальних закладах (ВНЗ) становлять 90 хв., а в деяких навчальних закладах – 80 хв.

**Мета роботи** полягала у розробці та експериментальному обґрунтуванні модифікованої програми шейпінг-тренування, застосування якої сприяло би вирішенню проблеми фізичного виховання студенток в обсязі навчальної програми для ВНЗ.

**Методи дослідження:**

– порівняльний аналіз і узагальнення;

– лабораторний педагогічний експеримент із застосуванням інструментальних методів;

– статистика;

– методи математичної статистики: визначення середньоарифметичних величин, відхилення від середніх величин та темпів зростання показників фізичної витривалості за модифікованою формулою Броді:

$$T_{i-1} = (P_i - P_v) \times 100 / (P_z + P_v) \times 0,5, \text{ де:}$$

$T_{i-1}$  – темп зростання і-го показника, (%)

$P_i$  – результат заключного тестування,

$P_v$  – результат вихідного тестування,

$0,5$  і  $100$  – константи.

**Організація дослідження.** На базі Національного університету „Львівська політехніка“ методом випадкової вибірки було сформовано експериментальну групу у