Przybylski G.[1], Pyskir M.[2], Pujszo R.[3], Pyskir J.[4], Bannach B.[5]

[1]Department of Respiratory Medicine and Tuberculosis, Nicolaus Copernicus University, Collegium Medicum in Bydgoszcz

2 Department of Rehabilitation, Nicolaus Copernicus University, Collegium Medicum in Bydgoszcz

3 Study Center for Physical Education and Sport, Kazimierz Wielki University in Bydgoszcz

4 Department of Biophysics, Nicolaus Copernicus University, Collegium Medicum in Bydgoszcz

5 Katedra Pielęgniarstwa i Położnictwa UMK w Toruniu Collegium Medium w Bydgoszczy Department of Nursing and Obstetrics, Nicolaus Copernicus University, Collegium Medicum in Bydgoszcz

Address for correspondence: Dr Grzegorz Przybylski
e-mail:gprzybylski@cm.umk.pl

The chosen indicators of women's physical condition on the verge of starting a family.

Wybrane wskaźniki kondycji fizycznej kobiet u progu założenia rodziny.

Streszczenie:

Cel: Wiele studentek bydgoskich uczelni zakłada rodzinę krótko po lub pod koniec studiów. Ważne jest by rozumiały one wpływ aktywności fizycznej na zdrowie kobiety – przyszłej matki. Wydaje się prawdopodobne, że nawyki ruchowe wyniesione z okresu szkoły średniej i studiów będą powielać dalej w założonej przez siebie rodzinie. Dlatego też podjęto próbę oceny sprawności fizycznej młodych kobiet uczących się w Bydgoszczy.

Materiał i metody: W latach 2002 – 2010 prowadzano badania z zakresu kultury fizycznej – sprawności fizycznej i wydolności fizjologicznej uczennic szkół średnich i studentek środowiska bydgoskiego. Wykonano pomiary dla zawodniczek trenujących rekreacyjnie różne dyscypliny sportu oraz dla kobiet nie trenujących. Przeprowadzano testy sprawności Eurofit, badania wydolności tlenowej oraz badania posturograficzne.

Wyniki i wnioski: Wykazano, że studentki aktywne fizycznie uzyskują lepsze wyniki w prowadzonych testach, co minimalizuje ryzyko wystąpienia w przyszłości wielu chorób. Aktywność fizyczna rozwija możliwość lepszego funkcjonowania w rodzinie i środowisku.

Prowadzone pomiary wskazują na konieczność zwiększenia zaangażowania studentek w czynne uczestnictwo w rekreacji ruchowej, szczególnie u progu założenia rodziny.

Słowa kluczowe: kobieta, zdrowie, kultura fizyczna, sprawność fizyczna.

Abstract

Aim: Many female university students in Bydgoszcz starts a family at the end of studying or in a short time after graduation. It is very important for them to understand the significance of health and good physical condition for being a mother. It is probable, that in future students will promote the fitness habits acquired at university in their families. Therefore the aim of this work is the attempt of assessment of young women's condition.

Material and methods: The investigations of fitness and physical efficiency of students in Bydgoszcz were conducted in years 2002-2010. There measurements were taken for women training different sports and for inactive students. The Eurofit tests, the aerobic and anaerobic efficiency tests and posture control tests were done.

Results and conclusions. It was shown that active students obtain better results in the conducted tests. Physical activity can give ability of better functioning in society and also minimizes the risk of many illnesses in future. The measurements show the necessity of increasing participation of students in physical activities, especially shortly before starting a family.

Key words: woman, health, physical education, fitness.

Introduction

Recently it often is said that physical condition of Polish community is worse than decades ago. Many diseases are diagnosed at increasingly younger women. Simultaneously many physical education teachers say that students, especially female teenagers, do not want to do physical exercise. According to GUS, the average time of physical activity of Polish girls is 15 min. per day [1]. Among the causes of this situation are crowded gyms, many hours spent by students in front of computer screens and wrong motor habits. The authors of this paper performed questionnaires in 2002 and 2009. In 2002, 67,5% of young women did exercise only during compulsory physical education lessons, in 2009 this percentage increased to

74,4%. It means that only every fourth student is active physically 2-3 times per week for 1,5 hour.

One way to improve women's physical condition is the promotion of physical activity. The best time for forming good habits are school and university years. Many young women start a family at the end or just after university. Having good motor habits they will promote such a behaviour in their families. It is the way to improve general condition and wellness of our society. To prepare the best program of physical education at university is the initial diagnosis of young women's condition necessary. That is why the aim of this work was an attempt of physical condition assessment of young women in Bydgoszcz by measurements of chosen parameters.

Materials and methods.

In this paper the authors present some results of investigations of young women physical condition done in years 2002-2009. The participants of this investigations were high schools and university female students in Bydgoszcz. Some of them did not practice physical activity except compulsory lessons, the second group recreationally trained different martial arts: aikido, karate, judo, wrestling.

The investigations included assessment of physical fitness, efficiency, working of postural control system. In each part the standard tests were conducted. The devices used in measurements are widely known.

To assess physical fitness the Eurofit tests were conducted. The first task measures agility. It is 10 x 5m shuttle test. The examined woman runs 10 times between two markers placed 5 m apart. The result is the time of running. The second test, known as Wells and Dillon test, measures the flexibility of the lower back and hamstring muscles. The result gives the difference in cm between hands and legs positions during trunk flexion done while sitting with legs stretched out straight ahead. The video demonstration of the test is given at the Internet [2]. The third part of Eurofit test was the bent arm hang test measuring upper body relative endurance and strength. The result is the time of free hanging with the chin on the level of a gymnastic bar. The final task from Eurofit tests was the standing long jump test whose result is the length of jump measured in cm. This test is considered to measure the explosive leg power.

For efficiency measurements, the rowing ergometer Concept II and the bicycle ergometer Monark were used. The aerobic efficiency was assessed by the *Astrand – Ryhming* test

performed on the bicycle ergometer and the PWC170 test on Concept II [3]. The anaerobic power was assessed by the Wingate test 30sek in the training group and the modified Wingate 15sec. in the non-training group. In the second group 30sec. test was too difficult.

The working of postural control system was assessed by stabilographic investigations. It is a well known method to measure body stability [4], stability in sport [5], body stability at different time of the day [6], and other problems of human body stability [7,8].

The parameters of stabilography were measured with Pro-Med J. Olton device. The centre of pressure (COP) trajectories were recorded in 32 sec. with open and closed eyes. The following parameters were analyzed: the statokinesjogram curve length, the statokinesjogram area, and the speed of COP movement. A part of participants performed stabilographic examination before and after making 6 summersaults. The imbalance after exercises was assessed by calculating the parameter defined as:

$$Z_1 = \left(\frac{S_1 - S_0}{S_0} \right) \qquad \text{Eqn.1}$$

Where: Z – the degree of imbalance

S_1 – the statokinesjogram area obtained after summersaults with open eyes

S_0 - the statokinesjogram area obtained before summersaults with open eyes

All results of experiments were statistically analyzed using Statistica and Excell software.

Results and discussion.

The first analyzed examinations were exercises chosen from Eurofit test. The results of the 10 x 5m shuttle test obtained in groups training different martial arts and inactive group is shown in Fig. 1. On the vertical axis the average time obtained in each group is presented. All training groups present similar results. The inactive students run in this test longer than training women. The result means that non-training students need more time for changing direction during movement. It is very probable that in everyday life the inactive student will not react fast enough in stress situations demanding agility, for example there is the necessity assurance of small children during their exercises.

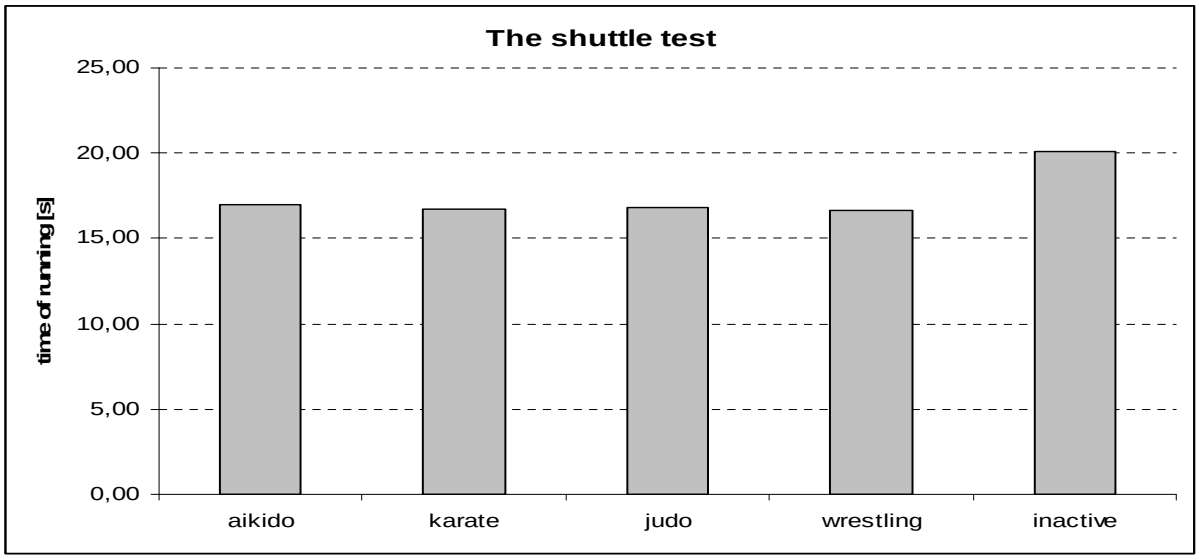


Fig. 1 The results of the shuttle test in different groups of investigated students.

The next examined feature was flexibility. The average distance between hands and legs positions obtained in different groups is shown in Figure 2. It is interesting that women training karate obtained 7% better result than wrestling women, which seems relatively big difference. Again, inactive student obtained worse results. It seems that the risk of injury during sudden movement in future is much higher for non training women. It can be seen that the percentage difference between inactive and training women groups in this test are higher than in the agility test.

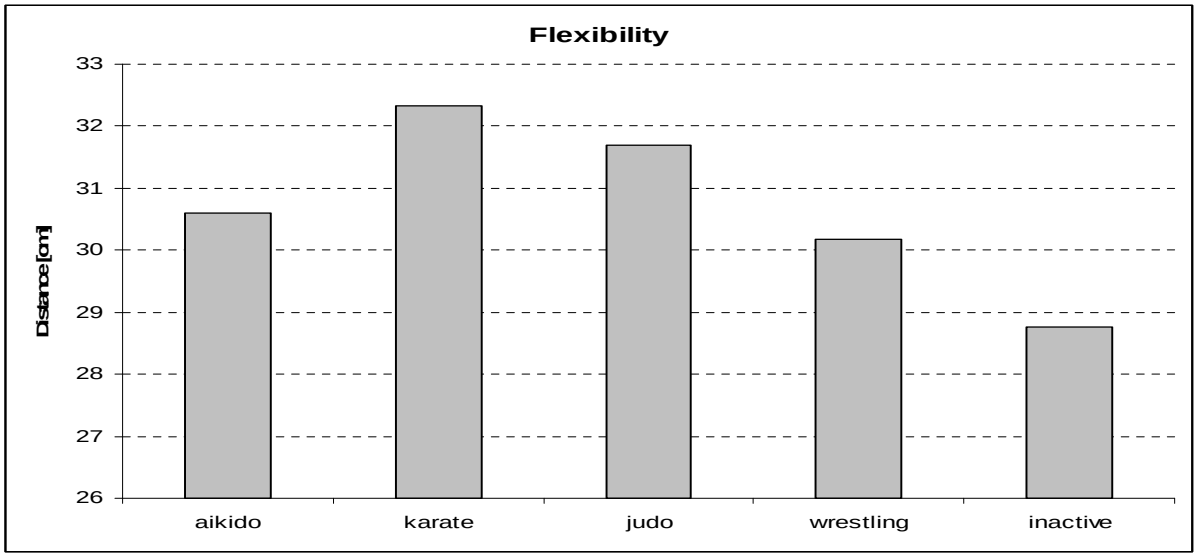


Fig. 2. The results of the flexibility test in different groups of investigated students.

The average times of hanging obtained in bent arm hang test are shown in the Figure 3. The best upper body relative endurance and strength is obtained by judo training women. They obtained over 2,5 times better result than inactive group. Even the aikido training students, the weakest among training groups, are over 30% better than inactive women. It should be emphasize that the feature measured by hanging test is very important for woman in nowadays. It is enough to mention heavier and heavier shopping bags, carrying children, housework.

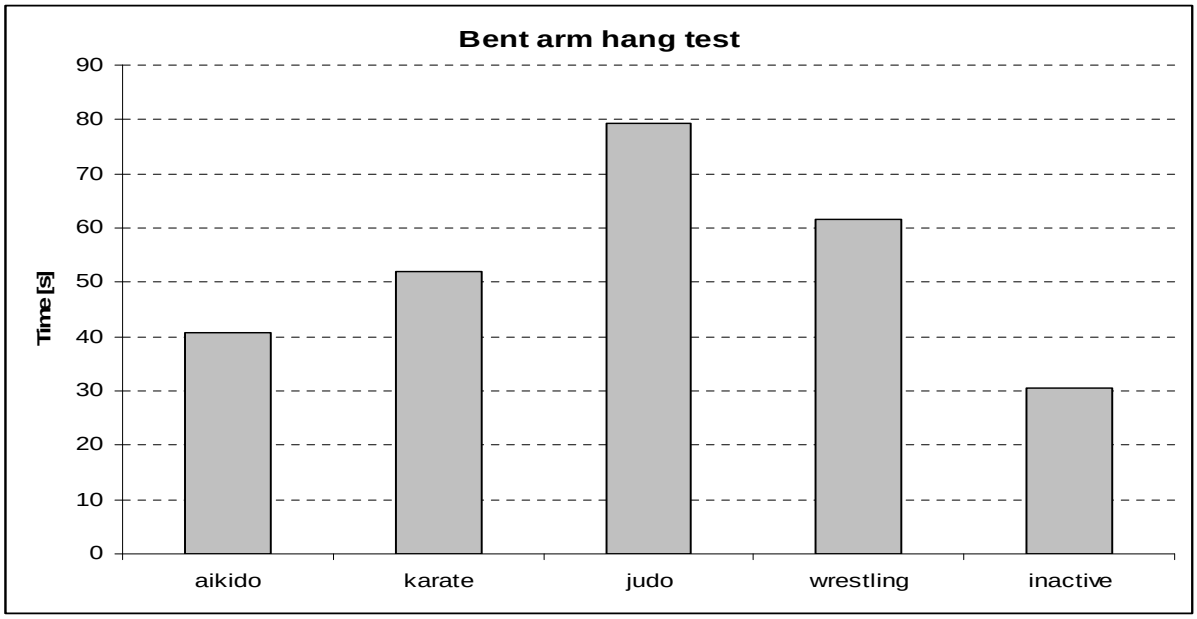


Fig. 3. The results of the bent arm hang test in different groups of investigated students.

The final task in the Eurofit test was standing long jump. The results are shown in Figure 4. Big differences are observed between different groups of active students. The judo and wrestling training women exceed 2 meters, while the average result of inactive group is less than 1,75 meters which gives almost 20 cm less than aikido students. The obtained result mean that inactive young women have much weaker legs than training ones. The risk of degenerative joint diseases and early sarcopenia is much higher in this group.

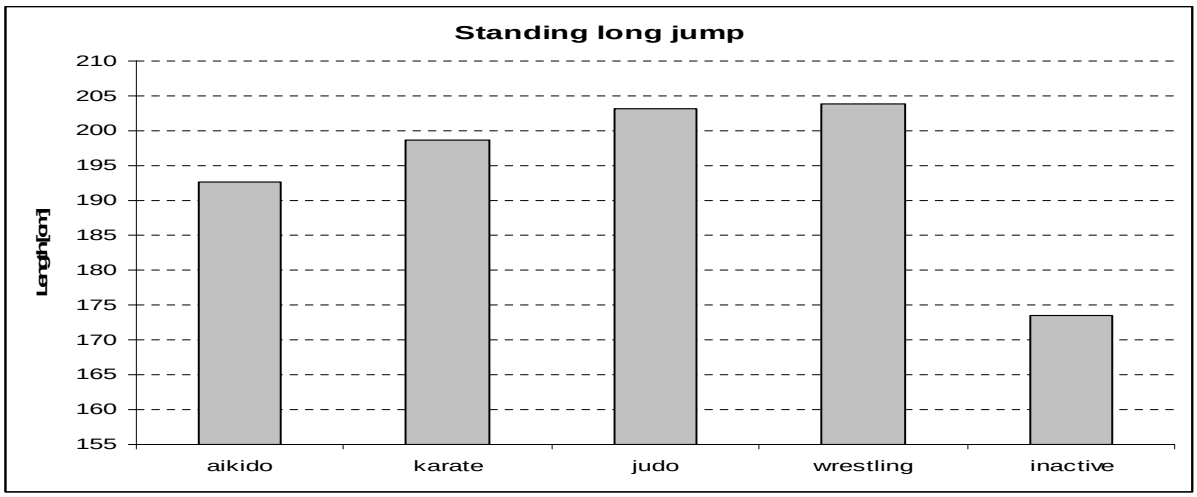


Fig. 4. The results of the standing long jump test in different groups of investigated students.

The next part of investigation included the efficiency test performed using ergometer. The *Astrand – Ryhming* method was used to determine the maximal oxygen consumption (VO_2 max) in ml/kg/min. In the aikido training group the aerobic capacity was 42,9ml/kg/min and was the lowest among training women. In the karate group it was 45,4 ml/kg/min and in the judo and wrestling groups respectively 47,9 and 46,9 ml/kg/min. The inactive group reached only 39,0 ml/kg/min which is significantly less than for the training women. Admittedly, the level needed for managing daily routines equals 17ml/kg/min, but this value is characteristic for over 70-year-old people. The bigger value VO_2 max in youth, the later minimum needed value of this parameter is observed. It is clearly visible that inactive women are more vulnerable to earlier wellness deterioration.

The anaerobic efficiency was assessed using Wingate - 30 test. The peak anaerobic power measured during the test was calculated per kilogram of body mass of the investigated women. The average values obtained in different groups are presented in Table I.

TABLE I.

The results of the Wingate-30 test in different groups of investigated students.

Group	aikido	karate	judo	wrestling	inactive
Peak anaerobic power per mass[W/kg]	8,6	8,96	9,31	9,30	7,7

In the group of inactive young women the Wingate test shortened to 15 sec. was conducted. This time the additional parameters were measured: anaerobic capacity and anaerobic fatigue. The results of the investigation are presented in Table II.

TABLE II. The results of the Wingate-15 test in inactive students.

Peak anaerobic power [W]	Peak anaerobic power per mass [W/kg]	Anaerobic capacity [*10 ^{3}J]	Anaerobic fatigue [%]
430,1 ± 87,08	7,34 ± 0,99	10,6 ± 2,1	13,29 ± 4,21

The relatively big uncertainties in this measurements should be noted. This proves big differentiation in the investigated group. However, the obtained average value of peak anaerobic power per mass is considered small, characteristic for people with low anaerobic efficiency. It can be assumed that in a longer test (30s) the obtained results could be worse.

Using rowing ergometer Concept II, the PWC tests were performed in different years. The aerobic efficiency was measured as power per unit of body mass. The examinations were performed at Kazimierz Wielki University in Bydgoszcz independently for women active only during compulsory physical education lessons (PE), and for recreationally training women (RT). Separately, the students with high BMI were assessed. In the PE group the statistically important improvement is seen. In 2002 the average result was 1,43 ± 0,3 W/kg [9], in 2004 1,48 ± 0,25 W/kg, reaching 1,49+0,35 W/kg in 2006. The better results confirm good practice conducted during physical education lessons at Kazimierz Wielki University. However, the results obtained by recreationally training women were much better. The average power per mass was 1,85 ± 0,23 W/kg in 2002 and 1,62 ± 0,2 W/kg in 2203. There were no volunteers taking part in measurements in 2004 and 2006 years. Unfortunately, women with high BMI obtained significantly worse results [10] - 1,17 ± 0,13 W/kg in different years. There was no improvement in results obtained in different years. It should be emphasized that students with high BMI often do not take part in physical education lesson. In this situation any improvement is hardly expected.

The next investigated property was the functioning of postural. control system. The graphs 5 and 6 below show examples of stabilograms and statokinesjogram obtained by young woman with open eyes before doing any exercises.

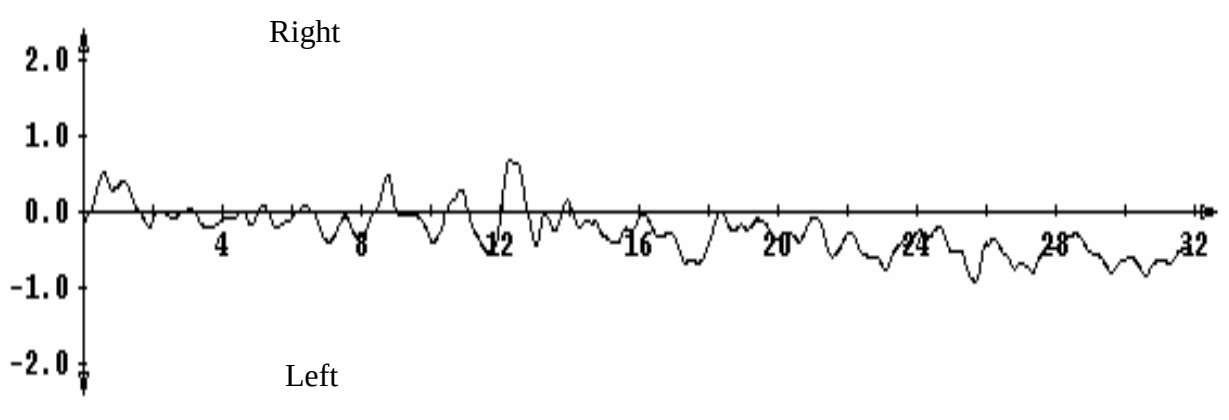
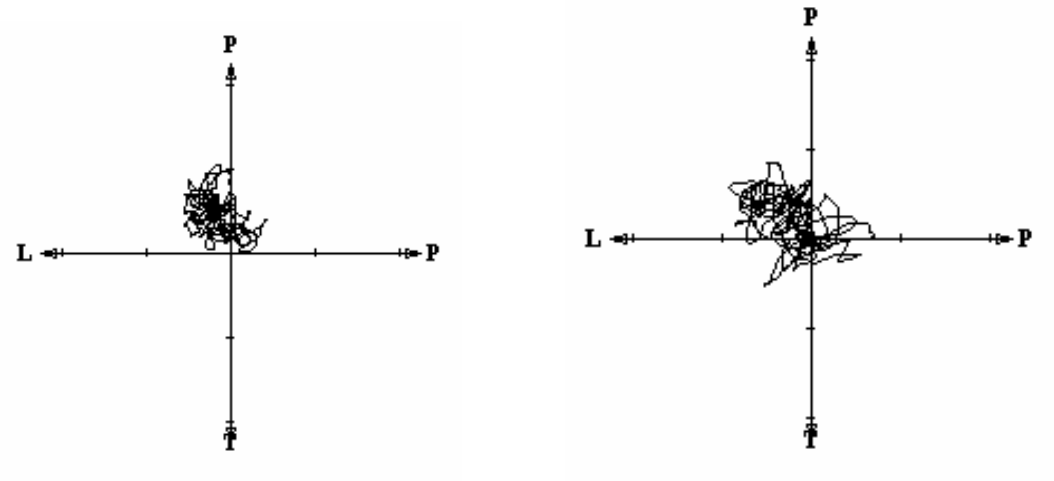


Fig.5. The example of stabilogram obtained by young woman with closed eyes.



(a) (b)

Fig. 6. The examples of statokinesjogram obtained by young woman wit opened (a) and closed (b) eyes.

The results obtained by authors confirm earlier investigations concerning researches physical fitness [5] and other [11], that a posturographic test performed with open eyes gives smaller values of calculated parameters than with closed eyes. The average length of statokinesjogram equals 196mm with opened and 242mm with closed eyes. The results of the area closed by this curve are respectively 208 mm^2 with opened eyes and 272mm^2 with closed eyes.

The unexpected results we obtained in the group of teenagers. Posturographic examinations were performed in the group of 14-16- year old girls and boys. It turned out that in the girls group the magnitudes of posturographic parameters are significantly smaller than in the group of the same age boys. The differences are observed as with opened as with closed eyes. The average length of statokinesjogram of 14-16-year old girls' is respectively 200mm with opened and 267mm with closed eyes. In the boys group it was obtained 220mm with opened and 305mm with closed eyes. The respective average areas of statokinesjogram are: 221mm^2 and 350mm^2 in the girls' group and 259mm^2 and 415mm^2 in the boys' group. It seems that the origin of obtained results can be different physical development of both groups. In contrast to the boys, the 16-year old girls are usually after physical maturity period. Boys of the same age grow up very fast.

Very interesting results were obtained by calculating the degree of imbalance Z after 6 summersaults. The initial examination (before summersaults) was performed without any aerobic or anaerobic exercise. In 2006 the parameter was determined separately for women training different mortal arts and for inactive students. The results are shown in Figure 7.

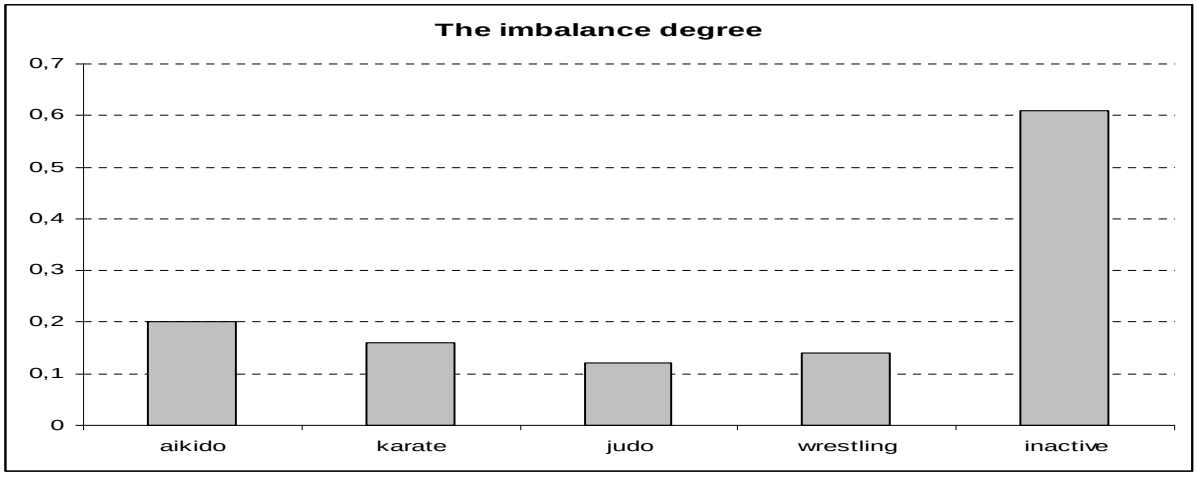


Fig 7. The imbalance degree in different groups of investigated students.

As it is clearly visible form the graph the postural control system of training students work much better than for the inactive group. The result of imbalance test in the last group is over 3 times worse than the worst result for the training women. It should be emphasized that in 2006 inactive female students obtained better results than in 2004 and 2007 when Z parameter was almost equal 1 in this group. The imbalance degree was almost 1 for training women after aerobic exercise. The same students after anaerobic effort obtained the result of

3,4. Although this is a high value, it should be emphasized that after such a strong effort, the women could do the test. It is very probable that inactive students could not stand on the platform after anaerobic exercise.

Conclusions

The percentage of young women for whom the only form of physical activity is compulsory physical education at school or university is appallingly high. It results in worse physical fitness, worse aerobic and anaerobic efficiency of organism and worse reaction of postural control system for imbalance. It directly results in worse fitness, especially needed for not only young woman but also in future. It is high probable that women having worse results in performed tests today, in future will be more susceptible to stress and different diseases. It leads to difficulties in everyday functioning in a family and society.

The obtained results show that the model of physical activity practised in Western Europe should not be introduced in Poland. In Western countries taking care of their own fitness depends almost only on women's awareness and commitment. In our country women are not aware enough of the importance of proper fitness habits, therefore it seems that the number of compulsory sport activities at school and university should not be reduced. Especially at universities, compulsory exercises should be longer to let trainers develop good fitness habits among future mothers.

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