

Physical activity and human health

Aktywność fizyczna a zdrowie człowieka

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Słowa kluczowe: zdrowie, ruch, aktywność fizyczna.

Abstract

Introduction: The dynamic development of the automotive industry, transport, and the media means that human life has become much easier. At the same time, the comfortable living conditions have decreased physical activity. Biologically conditioned, the need of activity has been minimised by the ever-increasing pace of life. As a result, it may lead to the loss of physical and mental health. Active recreation is not only an excellent source of activity, but also a source of satisfaction. Youths and adults should therefore spend their free time primarily on various forms of physical activity.

Aim of the research: To evaluate the physical fitness of students who regularly practice physical exercise, those who occasionally practice, and those not practicing any form of physical activity.

Material and methods: In the research we used a questionnaire of the Ruffier test and an orthostatic test. The study involved a group of 15 people aged 20–25 years. Participation in the study was entirely voluntary and anonymous. The study group consisted only of women. Results obtained from the questionnaire survey were fully reflected during exercise tests performed.

Results and conclusions: Only regularly practiced physical activity has an effect on our body. Regular exercise increases our body's physical capacity. Activity is the best means of prevention of lifestyle diseases. Youths and adults should spend their free time mainly doing various forms of physical activity.

Streszczenie

Wprowadzenie: Dynamiczny rozwój motoryzacji, transportu, środków masowego przekazu sprawił, że życie ludzkie stało się prostsze. Jednocześnie przez komfortowe warunki życia zmniejszyła się aktywność fizyczna. Biologicznie uwarunkowana potrzeba ruchu została zminimalizowana przez ciągle rosnące tempo życia. W rezultacie może to doprowadzić do utraty zdrowia fizycznego oraz psychicznego. Czynny wypoczynek stanowi doskonałe źródło nie tylko ruchu, lecz także satysfakcji, zadowolenia. Młodzież oraz osoby dorosłe powinny swój wolny czas poświęcać przede wszystkim na uprawianiu najróżniejszych form aktywności ruchowej. Już najmłodszych należy informować o pozytywnym wpływie ruchu na organizm człowieka. Osoby te w wieku dojrzałym mają świadomość, że poprzez ćwiczenia fizyczne poprawiają kondycję oraz stan zdrowia.

Cel pracy: Ocena wydolności fizycznej studentów regularnie uprawiających ćwiczenia fizyczne, sporadycznie ćwiczących oraz nieuprawiających jakichkolwiek form aktywności ruchowej.

Materiał i metody: W badaniu zastosowano kwestionariusz ankiety oraz próbę Ruffiera i próbę ortostatyczną. Badaniem objęto grupę 15 osób w wieku 20–25 lat. Udział w badaniach był całkowicie dobrowolny i anonimowy. Postawiono następujące hipotezy: częstość uprawiania aktywności fizycznej wpływa na wynik w próbie Ruffiera, uprawianie sportu zawodowo koreluje ze wskaźnikami masy ciała, liczba godzin spędzanych przed telewizorem lub komputerem warunkuje wynik próby ortostatycznej.

Wyniki i wnioski: Tylko regularna aktywność fizyczna wpływa na organizm. Systematyczne ćwiczenia zwiększają wydolność fizyczną. Ruch jest najlepszym sposobem profilaktyki chorób cywilizacyjnych. Młodzież oraz osoby dorosłe powinny wolny czas poświęcać przede wszystkim na uprawianiu najróżniejszych form aktywności fizycznej.

Introduction

The World Health Organisation (WHO) defines health as a state of complete physical, mental, and social state of the human, and not merely the absence of disease and impairment. It is therefore a condition in which the construction and function of all tissues

and organs are not only correct but also provide internal balance and the ability to adapt to ambient conditions, including social.

Good health is a constant and high level of energy, emotional balance, mental clarity, resistance to infectious diseases, and the ability to defend against can-

cer and cardiovascular disease, which in turn leads to slowing down the process of aging and eventually to a long life. Health is not merely the absence of suffering and physical pain, but the real state of our body and mind in which we can freely enjoy life. A proper diet, regular exercise, life in a healthy environment, changing bad habits, and appropriate coping with tension and stress can help you to achieve perfect health.

The threats faced by modern man mean that a healthy lifestyle should be promoted as widely as possible, which is aware of human behaviour conducive to improving, maintaining and protecting health. One of the behaviours is physical activity.

Among the factors determining the health status, 50% is assigned to the appropriate style of life, of which the key element is proper nutrition and physical activity. The concept of physical activity or physical means any muscular effort of a person above the level of rest. Its aim is to improve wellbeing and health. Physical activity is indispensable in the life of modern humans. For adults, it is used to maintain health and fitness, and for children and young people it is essential for normal development in terms of physical, mental, and social health.

Physical activity and its benefits are as follows: a healthy lifestyle (improving well-being, delaying the aging process, pleasure or joy in life); prevention of diseases (especially cardiovascular disease, musculoskeletal system, obesity); the ability to cope with stress by reducing the tension or stimuli to your body; treatment of disorders and diseases (in particular, diseases of the musculoskeletal system, obesity, hypertension) [1].

Physical exercise, which is the backbone of physical activity, gives the following: lowers blood pressure (especially in the case of people with borderline hypertension); reduces the risk of cardiovascular disease; protects against osteoporosis; increases the amount of bone mass; reduces body fat mass; helps to increase HDL cholesterol (the "good cholesterol") reducing the content in plasma small dense LDL ("bad cholesterol"); improves glucose tolerance and increases insulin sensitivity (lowers the risk of diabetes); enhances wellbeing; affects the overall level of organism efficiency.

Physical activity affects the entire body. Therefore, it is regarded as a determinant of health and a measure by which we can influence our health. Physical activity is a biological need of humans and gives us the preservation of health: its should be accompanied by human, regardless of age, gender, profession; its should be adequate to human capabilities.

Treatment of physical activity occupies a high position in modern medicine. With physical activity we can improve the functions of all the organs and increase the natural defences of body functions to fight

pathogenic effects of the environment. Appropriate doses of activity are the basis for medical rehabilitation and adjuvants for the treatment of other methods of modern medicine. Activity primarily affects systems directly related to the efficiency and exercise capacity of the body, i.e. the respiratory system, circulatory system and heart, autonomic nervous system, endocrine system, and the body's energy economy [2].

Tissie in the twentieth century emphasised that "activity can replace all the medicines, but no cure can be a substitute for activity".

Physical activity and the immune system

Health training also positively affects the body's immune processes. Moderate physical activity increases both specific and nonspecific immunity. Physical efforts activate agents of the innate immunity – neutrophils. As for the specific immunity, the changes are similar. Increased activity of lymphocytes and macrophages and their interaction leads to the production of antibodies in serum and body fluids. This plays a significant role in defending of the body against most viruses and bacteria [3].

Physical activity and chronic diseases

Increased physical activity can also be an effective way of preventing chronic diseases. Results clearly show that even minimal physical activity leads to a reduction in the incidence of chronic diseases. An important component of the treatment of diabetes, in addition to pharmacological or dietary treatment, is regular exercise because it can contribute significantly to improve the results of treatment. It has been shown that in people with type II diabetes physical exercise contributes to lower blood glucose. As a result, in patients who regularly have an active lifestyle, the dose of insulin should be reduced. However, the exercise used by diabetics must be preceded by knowledge of patients on physical activity as well as an indication by their doctor to exercise.

In addition, physical training "expands" the coronary arteries and peripheral vessels, consequently protecting against the development of heart disease and hypertension.

Exercise appropriately matched to individual capabilities accelerates and facilitates weight loss, but also helps to maintain the achieved effect. Thereby it is the basis for the treatment of obesity [3–5].

Physical activity and cancer

Physical activity is also important in the prevention of cancer. Research suggests that physical activity reduces the risk of kidney cancer, but only in the case of men. There is also a link between physical activity and the incidence of lung cancer. People who are physically active, especially athletes, have lower

incidence of lung cancer than people with sedentary life. The same correlation is also observed in the case of incidence of colorectal, breast, and prostate cancer. It was also demonstrated in the relationship of physical activity with the pathogenesis of pancreatic cancer. Physical exercise significantly reduces the risk of cancer of the prostate for men; for women there is a tendency to reduce the risk. Accordingly, it is worth paying attention to the positive relationship between physical activity and the risk of cancer [6].

Physical activity during pregnancy

Regular exercise is also recommended during pregnancy, providing a woman with physical fitness and improving wellbeing. In addition, physical activity during pregnancy adapts the body to effort, which is necessary for childbirth. Gymnastics during those 9 months increases the mobility of the spine and hip joints and gives more flexible and enlarged muscles of the pelvic floor and abdominal wall, which plays an important role in the act of maternity [7]. In addition, physical exercise prevents swellings, the formation of varicose veins, improves blood circulation in the circuit, and causes an increase in vital capacity of the lungs. You should also do exercises in the water, which are excellent preparation for a natural birth. Water can strengthen your muscles, without excessive effort, by maintaining the body weight of women. Note, however, that prior to the exercise one should consult a doctor to rule out possible pregnancy contraindications.

Physical activity during childhood

Physical activity also plays an important role in young organisms of growing children. It is therefore worth remembering about gymnastics as a child, so that the child already in early life can acquire healthy habits. Exercise strengthens bones and muscles, which become the foundation of a strong musculo-skeletal system. This helps to avoid problems with posture bridging overload related to education. From the fifth year of life it is advisable to perform activities influencing muscle strength, flexibility, and condition of the skeleton at least two times a week. An example would be a skipping rope, or jumping, or gymnastics. In addition, physical activity in childhood significantly reduces the risk of obesity, which nowadays plays a big role, because about 20% of boys and almost 30% of girls are overweight [8].

In conclusion, physical activity increases physical fitness and endurance of the body, leading to improved quality of life. Systematically performed exercise or physical effort significantly reduces the risk of so-called lifestyle diseases, namely hypertension, ischaemic heart disease, obesity, osteoporosis, or diabetes type 2 [9].

Aim of the research

The aim of the study was to evaluate physical fitness of students who regularly practice physical exercise, those who occasionally practice, and those not practicing any form of physical activity. This made it possible to determine the effect of regular physical activity on the human body as well as tolerance of exercise and the ability to quickly return to the state prior to effort.

Material and methods

The study involved a group of 15 people aged 20–25 years. Participation in the study was entirely voluntary and anonymous. In the study group where only women, among whom were those who were practicing physical exercises regularly, occasionally exercising, and avoiding physical activity. The study consisted of completing the questionnaire by students and included the measurement of exercise capacity in the group. Questions had the character of closed and semi-open. Ten questions were used. Withstanding attempts which women have been subjected are the Ruffier test and orthostatic test. The tested parameter, i.e. heart rate, was measured using an electronic device on the radial artery.

In the Ruffier test the person should perform 30 squats within 1 min. The squats must be made in full: maximum straighten and maximum squat. The pulse is examined on three occasions: before the trial, immediately after it, and after 1 min of rest (sitting). The results we substitute in the formula:

$$IR = [(P + P1 + P2) - 200]/10,$$

where: *IR* – Ruffier indicator, *P* – resting heart rate, *P1* – pulse immediately after the trial, *P2* – pulse after 1 min of rest. Result indicator: 0 – very good, 1–5 – good, 6–10 – average, over 10 – poor.

Orthostatic test: with the subjects lying on their back, we measured their heart rate for 1 min. Then they slowly got up and we measured the heart rate again for 1 min. Then, we evaluated the difference between heart rate measured in the lying and standing position. Result indicator (difference in heart rate of respondents): 6–12 beats/min – perfect, 13–18 – satisfactory, 19–24 – weak, over 24 – sign of a bad heart. Tests were carried in the sports hall at Krakow 72 Street in Kielce.

The following hypothesis was formulated, namely: the frequency of physical activity has an impact on the result in the Ruffier trial; sport professionally affects the results of body mass index (BMI); the number of hours spent watching TV/using a computer determines the orthostatic test result.

The coefficient of Spearman's rho. Kruskal-Wallis test was used.

Results

In the questionnaire completed by the study group physical activity was performed by 100% of players

VIVE Kielce. All respondents in this group had the correct BMI. Eighty percent of respondents spent an average of 3–4 h/day at the computer, and 20% spent 1–2 h/day. All of the respondents in this group were aware of how regular physical activity affects human health, but in spite of all tests some persons smoked cigarettes (60% regularly and 40% occasionally). Regarding the journey home from or to college or for training, 60% of the respondents in this group went on foot and 40% used other transport. Discomfort in the form of severe fatigue, tiredness, or shortness of breath after exercise did not occur in the studied persons in this group.

Twenty percent of respondents performed occasional physical activity once a week and 80% did this 2–3 times in a week, mainly in the form of aerobics, swimming, and volleyball. People in this group did not smoke cigarettes and 100% knew how regular physical activity affects human health. They also thought that they generally led a healthy lifestyle. Sixty percent of respondents spent on average 3–4 h/day in front of the TV or computer, and 40% spent 5 h or more. Unlike player of VIVE Kielce way from home to work or college up to 80% use transportation and only 20% on foot. The BMI of the respondents of this group were also valid. After exercise they did not feel strong fatigue or shortness of breath. Those symptoms occurred only after long-term effort.

The last group were people not practicing any physical activity. The only physical activity among this group of respondents was the walk from the house to the university or to work – 80% and 20% of respondents use public transportation or car, respectively. These individuals, despite avoiding exercise, also had correct BMI. Sixty percent of the respondents in this group did not smoke cigarettes and 40% smoked occasionally. After exercise 80% felt shortness of breath, fatigue, and weariness, and 20% of respondents felt similar complaints mainly after long-term effort. All of the respondents believed that sometimes they led a healthy lifestyle. Eighty percent of respondents spent 5 h or more in front of the TV and 20% spent 3–4 h/day. These people, although they did not practice physical activity, knew how it affects human health, which is very surprising.

The results obtained in the Ruffier test were presented in Table 1. The results obtained in the orthostatic test were presented in Table 2.

Evaluation of the impact of frequency of physical activity on the result of the Ruffier attempt

The coefficient of Spearman's rho was calculated. It was shown that there is a significant negative correlation between the variables. The result of the Ruffier attempt decreases with the increase in the frequency

Table 1. The results obtained in the Ruffier test by Ruffier indicator (*IR*)

Number	Group of people		
	VIVE Kielce	People occasionally exercising	People who are not exercising
x_1	1.8	5.3	11.8
x_2	2.9	9.6	13.7
x_3	4.3	5.4	13.2
x_4	2.1	9.0	14.0
x_5	3.5	7.2	11.6
Average results	2.92	7.3	12.86

x_1 – x_5 – sequentially

Table 2. The results obtained in the orthostatic test. The difference between the heart rate in lying and standing position

Number	Group of people		
	VIVE Kielce	People occasionally exercising	People who are not exercising
x_1	11	13	15
x_2	6	15	19
x_3	9	17	30
x_4	10	15	22
x_5	12	16	25
Average results	9.6	15.2	22.2

Table 3. Correlations

			How many times in a week do you perform physical activity?	Result in Ruffier attempt
Spearman's rho	How many times in a week do you perform physical activity?	The correlation coefficient	1.000	-0.945
		Significance (two-sided)	0.000	0.000
		N	15	15
	Result in Ruffier attempt	The correlation coefficient	-0.945	1.000
		Significance (two-sided)	0.000	0.000
		N	15	15

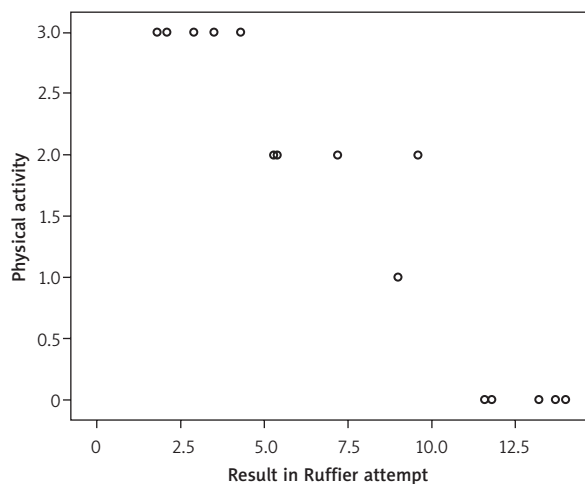


Figure 1. Correlations rho Spearmana

of physical activity ($\rho = -0.945$, $p < 0.001$). Results are shown in Table 3 and Figure 1.

Evaluation of how practicing sports professionally affects the body mass index

In order to compare the groups the basic statistical parameters were calculated and a box chart was used with the selected measures of position. In order to assess significance of differences between groups,

Kruskal-Wallis test was used. The level of statistical significance was set at $p < 0.05$ (Table 4 and Figure 2). Kruskal-Wallis test – Tables 5 and 6. It was shown that the differences between the groups are statistically significant.

Evaluation of the impact of time spent in front of the TV/at the computer on the result in an orthostatic attempt

In order to compare the groups with each other the basic statistical parameters were calculated and a box chart was used with the selected measures of position. In order to assess significance of differences between groups, Kruskal-Wallis test was used. The level of statistical significance was set at $p < 0.05$ (Table 7). Kruskal-Wallis test – Tables 8 and 9. It was shown that the groups do not differ significantly ($p = 0.080$).

Discussion

The research and considerations set out in the work does not exhaust the issues related to the levels of physical activity of students 20–25 years old, but allows us, to a large extent, to determine the level of activity.

The aim of the study was fully achieved. The physical fitness of students was measured, which

Table 4. Body mass index

Group	Median	Minimum	Maximum	Average	Standard deviation	N
A person who does not exercise	22.800	22.3	23.2	22.800	0.3391	5
A person who exercise occasionally	22.100	21.3	22.2	21.840	0.4099	5
A person who exercise regularly	20.600	20.3	21.2	20.660	0.3578	5
Total	22.100	20.3	23.2	21.767	0.9686	15

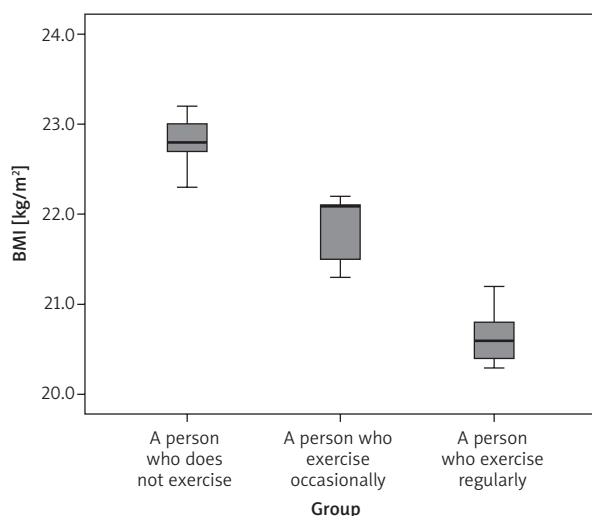


Figure 2. Test of Kruskal-Wallis

Table 5. Ranks

Group	N	Average rank
A person who does not exercise	5	13.00
A person who exercises occasionally	5	8.00
A person who exercises regularly	5	3.00
Total	15	

Table 6. Statistics of test

Parameter	BMI
χ^2	12.522
df	2
The significance of asymptotic	0.002

Table 7. Result in an orthostatic attempt

How much time per day do you spend on the computer, TV?	Median	Minimum	Maximum	Average	Standard deviation	N
1–2 h	10.00	10	10	10.00	–	1
3–4 h	12.50	6	25	13.50	5.757	8
5 h and more	17.50	15	30	19.50	5.822	6
Total	15.00	6	30	15.67	6.321	15

helped confirm the hypothesis that physical activity regularly practiced substantially affects the human body.

The obtained results of the questionnaire were fully reflected during performed exercise tests. Persons who declared in the questionnaire that they regularly exercised achieved the best results in the Ruffier test (average: 2.95). In an attempt of orthostatic test the average was 9.6. In both studies the results obtained show good physical fitness.

People occasionally exercising obtained in the attempts averages of 7.3 (Ruffier) and 15.2 (orthostatic), which confirmed their average physical performance.

In contrast, those who declared the avoidance of all forms of physical activity achieved the lowest results. Average trials of Ruffier test result was 12.86, and 22.2 in the orthostatic. These results indicate a poor functional capacity of the organism. It is worth remembering that only systematically practiced physical activity has an influence on the human body, which was confirmed by carried out studies.

All forms of active leisure time should be encouraged among the young, i.e. from early childhood. In the case of children, the study shows that about 30% of children have an optimal dose of activity, which

Table 8. Result in an orthostatic attempt

How much time per day do you spend on the computer, TV?	N	Average rank
1–2 h	1	3.00
3–4 h	8	6.38
5 h and more	6	11.00
Total	15	

Table 9. Statistics of the test

Parameter	Result in an orthostatic attempt
χ^2	5.042
df	2
The significance of asymptotic	0.080

is in line with current needs. The next 40% has too little inadequate physical activity, and participation in competition happens to them only occasionally. The remaining 30% are people who are reluctant to carry out any physical activity for health reasons, such as asthma, obesity, or posture [8].

Too little physical activity means that an increasing number of children and adolescents suffer from various kinds of health dysfunctions.

In recent years in Poland it was observed that: 70–90% of children have significant posture defects; 19% of girls and 9% of boys suffer from headaches and bad moods; in adolescents aged 17–19 years the risk of heart attack is starting to increase; 7% of adolescents suffer from hypertension; 1% of adolescents have obesity [10].

Madowska reported that 28% of young people do sports only 1–3 times a week, 22% practice 3–5 times a week, and 22% of the students participate in daily physical activity. Madowska also shows that young people most often do the following: cycling (82%), volleyball (80%), rollerblading or skateboarding (60%), swimming (54%), basketball (52%), football (44%), and table tennis (44%) [10].

Another opinion is offered by Żarnowski, who reported that only 13% of boys play recreational football, 18% basketball, and 2% practice some other sport [11].

When it comes to trips to winter sports or holiday camps, in my opinion the vast majority of students never leave. Likewise Żarnowski considered this (2002). He says that in the past 3 years 80% of young people do not go to the wintering grounds, and 50% for the colonies [11]. The problem is not only the financial aspect but also the parents' lack of awareness of the huge importance of physical activity in the development of psycho-mobility of their child. Therefore, both the school and parents need to take care of such matters, and children should spend their free time improving and increasing their fitness and health.

Verdaguer claim that the practising of any sport by parents promotes greater participation of the children in it. In order to determine it, they have examined 4301 boys and girls from Mallorca [12].

Lovecchio and Bussetti write that in Italy there are plenty of sports extracurricular activities, refunded by special finance by the Ministry of Education. This is the kind of invitation to Italian children and young people to devote more time to physical activity. In addition, more attention is paid to the same subject "Physical Education" in school [13].

Therefore, I appeal to parents to encourage children and young people to spend their free time outdoors, practicing various forms of physical activity. Ideally children should follow the example set by their parents, so let us all live an active life!

Conclusions

Only regularly practiced physical activity has an effect on our body. Regular exercise increases our body's physical capacity. Activity is the best means of prevention of lifestyle diseases. Youths and adults

should spend their free time mainly doing various forms of physical activity.

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