ZESZYTY NAUKOWE UNIWERSYTETU SZCZECIŃSKIEGO

NR 844 ACTA BIOLOGICA NR 21 2014

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BODY BUILD IN YOUNG MEN AND PEDOMETER-MEASURED DAILY PHYSICAL ACTIVITY

Abstract

Daily physical activity is necessary for the body to function normally. It is the key to maintaining health and a slender figure throughout life.

Materials and methods: the study included 30 young men ($\bar{x}$ = 22.2 years), students, who gave their consent to anthropometric measurements and a 3-day analysis of the number of steps taken measured with a pedometer.

Results: Somatic indices were calculated and showed that the arithmetic means of the young men's body weight, as well as waist and hip circumferences were in the normal range. Yet, an analysis of individual cases led to disturbing findings regarding the evaluation of nutritional status (BMI), proportions of adipose tissue distribution and body shape verification in connection with their daily physical activity. The majority of students (77%) declared that they were happy or quite happy with their figure. The average number of steps from the 3 days amounted to 6922.3 ±2078.2, which is a good result. The majority of students slept 7 or more hours at night, which allows the body to regenerate. Correlation calculations did not reveal a relationship between the number of steps taken and participants' body build. The human figure is determined by many different factors.

Keywords: physical activity, pedometer, body build, somatic indices

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Introduction

Regular physical activity improves fitness, speeds up metabolism, boosts well-being, protects against a wide range of diseases, including reducing the risk of obesity, protects the circulatory system warding off heart disease, contributes to stabilising blood pressure, lowers the risk of diabetes, and in those who suffer from it, helps control blood sugar levels (Engel and Linder 2006; Dasgupta et al. 2007). Physical activity can also cut the risk of lung, breast and colon cancer (Moller et al. 2013; Vallance et al. 2007). Engaging in sports strengthens the locomotor system and improves bone density.

The busy pace of modern life means that not everyone can find the time for extra physical effort outside of work or school. Still, even an ordinary walk has many health benefits. A simple form of activity can be a good way to burn fat. Yet nowadays daily physical activity is increasingly neglected. The dynamic growth of our civilisation has led to eliminating activity. Adults do not have time for physical activity, they are busy at work, often of a typically sedentary nature, at an office. And then at home there is a another set of chores which are not stimulating physically. The problem is exacerbated when children follow the example of their parents and they, too, avoid physical activity which is necessary for healthy development of the body.

These days, it is hard not to avoid mobility. The development of transportation and increasing car ownership create opportunities for significantly reduced physical activity compared to that of past generations. Motor vehicles help us save time which is a scarce resource today. Also, there is a general trend to design public spaces, such as shopping centres, schools, universities and workplaces, in a way that enables people to avoid physical activity, by installing lifts or escalators as standard.

Bad eating habits among the Polish people complicate the problems of overweight and obesity. Low consumption of fruit and vegetables, irregular meals in excessive amounts, too much sugar – these are common nutritional errors in Poland (Wądłowska 1996; Wyka and Żechałko-Czajkowska 2008; Łysiak-Szydłowska 2009; Słowińska et al. 2009). All this leads to obesity-related problems which underlie many of the so-called lifestyle diseases. The objective of this paper is to examine the relationship between daily walking activity of young men and their body build.

Materials and methods

The study material comprised a group of n = 30 of young male students. The average age of participants was 22.2 years. Study participants agreed to measure their physical activity over a period of 3 days. Measurements were conducted using an OMRON pedometer, model HJ720ITC. Data were collected in the autumn of 2013. The participating men were a group of friends. Selection of participants was based on trust and understanding of the nature of the study. Each man undertook to put the pedometer on in the correct way immediately upon getting up in the morning and to keep it on throughout the day. If a participant deviated in any way from the adopted study methodology (e.g. forgot to wear the pedometer or took it off during the day), measurements for the whole day had to be repeated.

The following anthropometric measurements were taken in the study group: body height (B-v), body weight, waist circumference and hip circumference. Participants filled in a questionnaire regarding their lifestyle, sleep duration and satisfaction level with own body shape.

Based on body measurements, the following somatic indices were calculated:

- BMI (Body Mass Index), from the formula: body weight [kg]/(B-v)^2 [m]. Interpretation of results: BMI < 16.00 3° slenderness, BMI 16.00–16.99 2° slenderness, BMI 17.00–18.49 1° slenderness, BMI 18.50–24.99 normal variation, BMI 25.00–29.99 1° overweight, BMI 30.00–39.99 2° overweight (obesity), BMI 40.00> 3° overweight (massive obesity) World Health Organization (2013).
- WHR (Waist-to-Hip Ratio), according to the formula: waist circumference [cm]/hip circumference [cm] WHR ≥ 0.8 and WHR ≤ 1.0 for men is the range assumed for the android type (WHO 2000).
- WHtR (Waist-to-Height Ratio), from the formula: waist circumference [cm]/(B-v) [cm]. The following classification was adopted: ≥0.46 < 0.53 healthy; ≥0.53 < 0.58 overweight; ≥0.58 < 0.63 seriously overweight; ≥0.63 obese. (Ashwell and Hsieh 2005).
- Rohrer's index, from the formula: body weight [g]/(B-v)^3 [cm] × 100. In the interpretation of Rohrer's index, scores ≤1.34 were adopted as the range for slender men, whereas scores >1.34 were adopted as signifying a stout figure (Malinowski and Bożiłow 1997).

Anthropometric measurements and derived indices allowed for an assessment of nutritional status, adipose tissue distribution and verification of the participating men's figures in combination with their physical activity. The use of the pedometer made it possible to count the number of steps taken during the day. The study includes an analysis of 3 days' step counts, which allowed for estimating the distances covered on foot. An average number of step was calculated from the three days.

In the questionnaire, the young men self-assessed their physical activity level: active, moderately active, sedentary. They also answered questions about sleep duration (number of hours), and whether they were satisfied with their figure: yes, rather yes, no.

In order to interpret the results for all the items under analysis, the arithmetic mean ($\overline{x}$), minimal and maximal values (min-max) and median (Me) were calculated. Moreover, the correlation between somatic measurements and indices, and the step count was examined. Statistical calculations were performed using Statistica 10.0 PL StatSoft, Inc. (2011).

Results

The anthropometric measurements collected are presented in the table below.

Table 1. Anthropometric measurement results of the participating young men

Measurement	$\overline{x}$ ± SD	Min–max	Me
Body height (B-v) [cm]	181.77 ±5.41	173.0–192.0	181.5
Body weight [kg]	81.90 ±8.60	62.0–98.0	81.0
Waist circumference [cm]	85.93 ±5.71	77.0–103.0	85.5
Hip circumference [cm]	92.03 ±5.81	83.0–106.0	92.0

Anthropometric measurements were used as a baseline for calculating the following somatic indices: BMI (Body Mass Index), WHR (Waist-to-Hip Ratio), WHtR (Waist-to-Height Ratio) and Rohrer's index. The results are presented in the table below.

Table. 2 Somatic index results of the participating young men

Measurement	$\bar{x} \pm SD$	Min–max	Me
BMI	24.71 ±2.14	18.11–28.09	25.26
WHR	0.934 ±0.03	0.85–1.04	0.93
WHtR	0.47 ±0.03	0.42–0.55	0.48
Rohrer's index	1.43 ±0.12	1.15–1.68	1.47

The average BMI score of the participants corresponds to normal body weight. Among the participants with normal body weight, there were also individuals whose weight in proportion to body height was outside the normal range. One participant's body weight was too low (BMI ≤ 18.49) while n = 15 men were overweight (BMI ≥ 25). None of the examined participants scored higher than BMI > 29.99, which means that there were no obese individuals in the study group.

WHR results indicate that the participating men fell in the range characteristic of the android body type. The median (Me) of the WHR ratio did not exceed ≥1, either. Therefore, the majority of men had normal (male) body build. The adipose tissue distribution in the studied young men was characteristic of the typical male body shape.

The WHtR ratio is a measure of body fat distribution which identifies abdominal adiposity. The male participants had body build corresponding to healthy body fat distribution. Among them, n = 7 scored too low on the ratio (WHtR < 0.46) and one person exceeded the normal range (WHtR > 0.53). The average as well as median (Me) WHtR ratio shows that the majority of study participants have a normal ratio of abdominal (visceral) fat distribution.

By analysing Rohrer's index one may conclude that slender people constituted a minority among the study participants, with the arithmetic mean of this ratio exceeding 1.34, corresponding to a stout figure.

The men included in the study measured their physical activity using a pedometer over a course of 3 days. The results collected are presented in Table 3.

Table 3. Number of steps taken by the young men

Measurement	$\bar{x} \pm SD$	Min–max	Me
Day 1	6916.1 ±2343.3	3756.0–12505.0	6330.0
Day 2	6730.4 ±1987.3	4016.0–12320.0	6362.0
Day 3	7120.5 ±2138.1	4337.0–12634.0	6664.5
Average daily step count from 3 days	6922.3 ±2078.2	4202.0–12454.7	6413.3

As seen in Table 3, the walking activity of the studied men in the course of 3 days was relatively similar. Both the arithmetic mean and median represent a comparable number. This may signify that the material underlying the study was homogeneous. The information collected on the step count could be used to estimate the average distance covered by the study participants. Assuming that the length of an average male step is about 70 cm, the average distance covered in a day was approximately 4.8 km. The shortest distance covered was 2.6 km, and the longest – 8.8 km.

Correlations calculated for the number of steps versus anthropometric measurements and somatic indices did not reveal a relationship. In turn, the analysis of calculations uncovered a correlation between body height and body weight ($r = 0.54$; $p = 0.002$) as well as between body height and waist circumference ($r = 0.39$; $p = 0.035$), and body height and hip circumference ($r = 0.36$; $p = 0.047$). A strong relationship may also be observed between the BMI index and WHtR ($r = 0.66$; $p = 0.000$). The BMI index shows a correlation with Rohrer's index ($r = 0.46$; $p = 0.010$) and the WHtR ratio is also highly correlated with Rohrer's index ($r = 0.73$; $p = 0.000$).

Questionnaire results

The study also included a questionnaire, which included questions regarding the young men's lifestyle, sleep duration and satisfaction with own body. 20% of respondents declared that they were satisfied with their figure, 57% were "rather satisfied", while 23% expressed a lack of satisfaction with their body shape. Results of the physical activity self-assessment were as follows: 30% active, 53% moderately active and 17% low active. The combined questionnaire data on the number of hours of night sleep are: 27% declared that they slept 9 hours or more, 60% of the examined men slept 7–8 hours per night, and 13% slept 6 hours or less. Answers to the question on naps during the day: 27% do not nap during the

day and the same number of participants declare that they do take naps during the day, while 46% rarely nap during the day.

The findings from the questionnaire presented above show that an average male participant was rather satisfied with his figure, engaged in moderate physical activity, slept about 7–8 hours per day and napped rarely.

Discussion

An average person living in Europe or the USA takes less than 5,000 steps per day. This level of physical activity is regarded as a sedentary lifestyle. A step count in the range of 5,000–7,499 is considered to indicate a low activity level. A score of 7,500–9,999 steps corresponds to a moderately active lifestyle; and the range of 10,000–12,499 is characteristic of active individuals. Finally, taking more than 12,500 steps a day is regarded as a very high activity level (Tudor--Locke et al. 2009).

In Japan, Yoshiro Hatano studied daily step counts as a way for reducing the risk of obesity and preventing diseases such as diabetes or heart disease. His studies demonstrated that the majority of people take between 3,500 and 5,000 steps a day, which is too little to have any considerable health benefits. This may suggest that increasing one's physical activity is advisable especially for health reasons, to compensate for the inactivity at work (Tudor-Locke et al. 2008).

The participating students on average took just under 7,000 steps a day. According to the available data, this figure is above the average for the populations of Europe and the USA. Research studies show that a daily step count in excess of 10,000 is found in people who have an active lifestyle; whereas a score in excess of 12,000 steps is recommended for weight loss (Leermakers et al. 2000).

The average step count of the study group may be due to the fact that the men lived in a city, where a well-developed public transportation network to a certain extent eliminated the need for walking activity. A research study by Groffik and Skalik (2005) showed that rural youth achieved significantly more steps/day compared to the research participants. Young people in rural areas took on average as many as 20,003 steps on working days, and on days off the step count was also in excess of 15,000. Such a high level of physical activity among rural youth can be associated with the fact that the school is often quite a distance away from home, even in a different village/town. Moreover, young people often

help with the farm work and this means that their physical activity is higher than that of city-dwelling young people.

The men included in the study were asked to self-assess their lifestyle in terms of physical activity. The majority described themselves as moderately active, while only 30% of the men considered themselves to be active. Findings from the questionnaire regarding the level of physical activity are confirmed by pedometer scores. The number of steps/day suggests that the study material was comprised mainly of men engaging in moderate physical activity, which matches the participants' own assessment of their activity level. The physical activity self-assessment provides crucial information, but it must be emphasised that it is a subjective opinion. Studies show that overweight and obese people tend to overestimate their actual physical activity in self-assessment, while at the same time viewing their excess weight as an obstacle to physical activity (Plewa et al. 2008; Ball et al. 2000).

The next item in the questionnaire addressed the issue of the amount of sleep that the participants got and whether they napped during the day. Modern medicine has been devoting increasing attention to both the quality and quantity of night sleep. In highly developed countries, the problem of inadequate sleep duration is becoming a very alarming phenomenon. Sleep disorders, poor sleep quality and insufficient night sleep entail a range of health implications. Problems caused by sleep deprivation can be very serious. According to research findings, sleep is strongly related to cardiovascular diseases and stress levels. It turns out that sleep disorders are an often overlooked risk factor in ischemic heart disease, heart attack, or even sudden cardiac death (Jakuszkowiak and Jakitowicz 2005).

Sleep disorders may be caused by fatigue, in a phenomenon referred to as Karōshi. This Japanese term translates to death from overwork and involves a sudden acute heart attack. Uehata (1991) demonstrated that victims of Karōshi were 203 people who worked more than 60 hours a week and also used only half of their statutory holidays in the years preceding the heart attack. People today work a lot, they fail to find the time to relax, while often devoting too many hours to work, and consequently there is never enough time for the body to regenerate (Żołnierczyk-Zreda 2009).

Research findings show that inappropriate amounts of sleep are a significant factor in coronary disease, and this applies both to people who do not get enough sleep and those who sleep more than 9 hours a day. A study by Ayas (2003) showed that women who sleep more than 9 hours a day have an increased

risk of ischemic heart disease, heart attack or even death by 39%. In turn, for women who sleep 5 hours and less a day the risk goes up by 18%, compared to those who sleep more. Research findings show that sleep duration may also be linked to weight-related problems. Spigel et al. (1999) demonstrated that people whose night sleep was limited to 4 hours a day developed glucose intolerance. Studies have also proven that people who slept too little had 50% higher insulin concentrations compared to people who slept about 8 hours a day. This parameter indicates a potential risk of diabetes.

BMI scores in the present study showed that study participants for the most part had normal body weight. Yet, the average BMI score is very close to 25. Such a result signals that a person may become overweight. Still, BMI scoring is an inaccurate method for determining whether a given person has the right weight for their height. BMI fails to take into account body type, sex and bone density. The mathematical weight-to-height ratio does not differentiate between muscle mass and adipose tissue. On the other hand, BMI is a non-invasive measure which does not require specialist instruments and that is why it is used in many scientific and popular-science papers.

Another indicator calculated from the collected measurements was the waist-to-hip ratio (WHR). The scores show that a significant majority of men represented the android body type. The average WHR was <1. This may mean that despite considerable body mass, the examined students had a sufficiently low adipose tissue mass compared to muscle mass.

In 1956, a thesis was put forward suggesting that in men, WHR > 1 was closely linked to the incidence of type 2 diabetes and atherosclerosis (Vague 1956). Since then, many studies were carried out and successfully confirmed this thesis. Research findings demonstrated unambiguously that abdominal obesity is the most reliable indicator for predicting metabolic syndrome with all its components. Studies helped ascertain that BMI scoring is not enough to determine the type and degree of overweight in participants in combination with susceptibility to type 2 diabetes and atherosclerosis. Research findings show that it is WHR that is one of the most reliable indicators for the development of ischemic heart disease and is also associated with the incidence of type 2 diabetes (Kinalska et. al. 2006).

There was a cross-sectional study in the 1980s which showed unambiguously that the prevalence of glucose tolerance disorders, hypertriglyceridemia and arterial hypertension was enhanced in people whose WHR was too high

(Kissebah et al. 1982). The available data suggest that an increasing percentage of people have elevated WHR ratios, which predicts quite a bleak future with the prevalence of type 2 diabetes and cardiovascular disease reaching epidemic proportions (Małecki 2006).

Findings with regard to WHtR, which is an indicator for central fat distribution, show that the participating men had a normal ratio of adipose tissue to body height. WHtR has recently been hailed as the most effective measure of obesity, applicable to children as well as young people and adults. Taylor et al. (2000) and Savva et al. (2000) believe that WHtR is a markedly better indicator for assessing the risk of cardiovascular disorders than BMI. The WHtR ratio is closely linked to the measurements of waist and hip circumference, which provide a better insight into the participants' degree of obesity. By the same token, it is a more effective method for checking whether the participating men fell into the category with an increased risk of type 2 diabetes, atherosclerosis and other diseases caused by excess weight (Nawarycz and Ostrowska-Nawarycz 2007).

Rohrer's index scores show that the majority of the studied men had a stout figure. This is, however, a rather vague measure, which only determines the degree of slenderness. To check whether the participating men had a "healthy" body build, WHR and WHtR ratios are more effective measures.

The above findings may suggest that the young men had a muscular body type, with a relatively high proportion of muscle tissue and a safe level of fat tissue. Research findings suggest that the study material was homogeneous. The participating men had similar body weights and their anthropometric measurements were also in a similar range. The low diversity of scores may be caused by the fact that the men constituted a group of friends who spent their free time together being active. They shared similar lifestyles, common interests and sporting passions.

Conclusions

1. The men included in the study, according to BMI scoring, had adequate body weight in terms of the arithmetic mean. Following an analysis of other somatic indices, it may be concluded that they had a relatively high body weight to height ratio due to their high muscle mass.

2. The men were characterised by a stout figure, with the android type of fat distribution, without excess abdominal adiposity – again, in terms of the arithmetic mean.

3. Normal fat distribution indicates that the majority of participants do not have an increased risk of developing diabetes. This result may be regarded as evidence of the health benefits of daily physical activity.

4. The data obtained with a pedometer show that the study group took an above-average number of steps/day for a Polish person.

5. Pedometer scores place the men participating in the study into the moderately active category according to guidelines from professional literature. This result is supported by the participants' self-assessment of physical activity participation.

6. The average night sleep duration in the young men was sufficient for health and body regeneration.

7. Correlation calculations did not show a relationship between the number of steps taken and participants' body build. The human figure is determined by many different factors.

References

Ashwell M., Hsieh D.S. 2005. Six reasons why the waist-to-height ratio is a rapid and effective global indicator for health risks of obesity and how its use simplify the international public health message on obesity. *Int. J. Food. Sci. Nutr.*, 56 (5): 303–307.

Ayas N.T., White D.P., Manson J.E., Stampfer M.J., Speizer F.E., Malhotra A., Hu F.B. 2003. A prospective study of sleep duration and coronary heart disease in women. *Arch. Inter. Med.*, 163 (2): 205–209.

Ball K., Crawford D., Owen N. 2000. Too fat to exercise? Obesity as a barrier to physical activity. *Aust. N. Z. J. Public Health*, 24: 331–333.

Dasgupta K., Chan C., Da Costa D., Pilote L., De Civita M., Ross N., Strachan I., Sigal R., Joseph L. 2007. Walking behaviour and glycemic control in type 2 diabetes: seasonal and gender differences – study design and methods. *Cardiovascular diabetology*, 6:1.

Engel L., Lindner H. 2006. Impact of using a pedometer on time spent walking in older adults with type 2 diabetes. *The Diabetes Educator*, 32: 98–107.

Groffik D., Skalik K. 2005. *Aktywność ruchowa młodzieży wiejskiej*. Roczniki Naukowe AWF w Poznaniu. Zeszyt 54.

Jakuszkowiak K., Jakitowicz J. 2005. Wzorzec snu nocnego a choroba niedokrwienna serca. *Sen*, 5 (2): 69–73.

Kinalska I., Popławska-Kita A., Telejko B., Kinalski M., Zonenberg A. 2006. Otyłość a zaburzenia przemiany węglowodanowej. *Endokrynologia, Otyłość, Zaburzenia Przemiany Materii*, 2 (3): 94–101.

Kissebah A.H., Vydelingum N., Murray R., Evans D.J., Hartz A.J., Kalkhoff R.K., Adams P.W. 1982. Relation of body fat distribution to metabolic complications of obesity. *J Clin Endocrinol Metab*, 54 (2): 254–260.

Leermakers E.A., Dunn A.L., Blair S.N. 2000. Exercise management of obesity. *Med. Clin. North. Am.*, 84: 419–440.

Łysiak-Szydłowska W. 2009. *Ocena stanu odżywiania. Postępy żywienia klinicznego nr 2*. PZWL.

Małecki M.T. 2006. Otyłość – insulinooporność – cukrzyca typu 2. *Kardiologia Polska*, 64: 10.

Malinowski A., Bożiłow W. 1997. *Podstawy antropometrii. Metody, techniki, normy*. Wydawnictwo Naukowe PWN, Warszawa–Łódź.

Moller T., Lillelund C., Andersen C., Ejlertsen B., Norgaard L., Christensen K.B., Vadstrup E., Diderichsen F., Hendriksen C., Bloomquist K., Adamsen L. 2013. At cancer diagnosis: a 'window of opportunity' for behavioural change towards physical activity. A randomised feasibility study in patients with colon and breast cancer. BMJ open 3 (11): e003556.

Nawarycz T., Ostrowska-Nawarycz L. 2007. Otyłość brzuszna u dzieci i młodzieży – doświadczenia łódzkie. *Endokrynologia, Otyłość, Zaburzenia Przemiany Materii*, 3 (1): 1–8.

Plewa M., Szuta A., Spyt A., Zahorska-Markiewicz B., Markiewicz A. 2008. Zastosowanie urządzenia ActiGraph (model GT1M) w 7-dniowym pomiarze wydatku energetycznego oraz liczby kroków w przebiegu kuracji odchudzającej. *Endokrynologia, Otyłość i Zaburzenia Przemiany Materii*, 5 (1).

Savva S.C., Tornaritis M., Savva M.E., Kourides Y., Panagi A., Silikiotou N., Georgiou C., Kafatos A. 2000. Waist circumference and waist-to-height ratio are better predictors of cardiovascular disease risk factors in children than body mass index. *Int. J. Obes Relat. Metab. Disord.*, 24 (11): 1453–1458.

Słowińska M.A., Kałuża J., Brzozowska A., Roszkowski W., Wądołowska L. 2009. All-cause mortality among the older people from Olsztyn and Warszaw regions in relation to socid-demographic and lifestyle factors and food intake – a short report. *Pol. J. Food. Nutr. Sci.*, 59 (1): 95–99.

Spiegel K., Leprout R., Van Cauter E. 1999. Impact of sleep debt on metabolit and endocrine fuction. *Lancet*, 23.

Taylor R.W., Jones I.E., Williams S.M., Goulding A. 2000. Evaluation of waist circumference, waist-to-hip ratio, and the conicity index as screening tools for high trunk fat mass, as measured by dual-energy X-ray absorptiometry, in children aged 3–19 y. *Am. J. Clin. Nutr.*, 72 (2): 490–495.

Tudor-Locke C., Hatano Y., Pangrazi R.P., Kang M. 2008. Revisiting "How many steps are enough?". *Med. Sci. Sports. Exerc.*, 40 (7 Suppl): 537–543.

Tudor-Locke C., Johnson W.D., Katzmarzyk P.T. 2009. Accelerometer-determined steps per day in US adults. *Med. Sci. Sports. Exerc.*, 41: 1384–1391.

Uehata T. 1991. Long working hours and occupational stress-related cardiovascular attacks among middleaged workers in Japan. *Journal of Human Ecology*, 20: 147–153.

Vague J. 1956. The degree of masculine differentiation of obesities: a factor determining predisposition to diabetes, atherosclerosis, gout, and uric calculous disease. *Am. J. Clin. Nutr.*, 4 (1): 20–34.

Vallance J.K., Courneya K.S., Plotnikoff R.C., Yasui Y. and Mackey J.R. 2007. Randomized controlled trial of the effects of print materials and step pedometers on physical activity and quality of life in breast cancer survivors. *J. Clin. Oncol.*, 25: 2352–2359.

Wądołowska L. 1996. Wpływ czynników środowiskowych na sposób żywienia młodzieży akademickiej. *Żywienie Człowieka i Metabolizm*, 23 (1): 10–17.

World Health Organization. 2013. Health topics, Obesity and overweight. *Fact sheet*, 311, Updated March 2013.

World Health Organization. 2000. Obesity: preventing and managing the global epidemic. WHO Technical Report Series, Vol. 894. Geneva.

Wyka J., Żechałko-Czajkowska A. 2008. Spożycie grup produktów wśród otyłych mieszkańców Wrocławia. *Roczniki PZH*, 59 (2): 231–236.

Żołnierczyk-Zreda D. 2009. Długi czas pracy a zdrowie fizyczne pracowników. *Bezpieczeństwo Pracy: Nauka i Praktyka*, 3: 6–8.

BUDOWA CIAŁA MŁODYCH MĘŻCZYZN A CODZIENNA AKTYWNOŚĆ RUCHOWA MIERZONA PEDOMETREM

Streszczenie

Codzienna aktywność fizyczna jest niezbędna do prawidłowego funkcjonowania człowieka. Jest kluczem do utrzymania zdrowia i smukłej sylwetki w każdym wieku.

Materiał i metody: w badaniach udział wzięło 30 młodych mężczyzn ($\bar{x}$ = 22.2 lata), studentów, którzy zgodzili się na pomiary antropometryczne i 3-dniową analizę liczby kroków zbadaną pedometrem.

Wyniki: Wyliczono wskaźniki somatyczne, które pozwoliły określić, że średnie arytmetyczne masy ciała, obwodu pasa i bioder młodych mężczyzn znalazły się w zakresie normy. Jednak analiza pojedynczych niektórych osobników jest niepokojąca w świetle oceny stanu odżywienia (BMI), proporcji w dystrybucji tkanki tłuszczowej oraz weryfikacji sylwetki badanych młodych mężczyzn w powiązaniu z ich codzienną aktywnością ruchową. Większość studentów (77%) zadeklarowała, że jest zadowolona lub raczej zadowolona z własnej sylwetki. Średnia liczby kroków z 3 dni wyniosła 6922.3 ±2078.2 co jest wynikiem dobrym. Większość studentów śpi 7 lub więcej godzin w nocy, co umożliwia regenerację organizmu. Wyliczenia korelacji nie wykazały zależności między liczbą wykonanych kroków, a budową ciała u badanych mężczyzn. Ludzka sylwetka jest determinowana przez wiele czynników.

Słowa kluczowe: aktywność fizyczna, pedometr, budowa ciała, wskaźniki somatyczne

Cite this article as: Rębacz-Maron E., Zarzycki R. 2014. Body build in young men and pedometer-measured daily physical activity. *Acta Biologica*, 21: 135–148.