

Lifestyle and body composition on irrigation and pH of physiotherapy students

Authors' Contribution:

- ✗ A Study Design
- 📁 B Data Collection
- 📊 C Statistical Analysis
- 📄 D Manuscript Preparation
- 📁 E Funds Collection

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Received: 20 September 2021; **Accepted:** 14 October 2021; **Published online:** 05 November 2021

AoBID: 15959

Abstract

Background & Study Aim:

Nowadays the topic of health for many young people goes to the background. The issues of rational nutrition, preventive examinations and physical activity are neglected. Interest in health grows only when there are disturbing symptoms that may indicate the development of the disease and often then it is too late to fix the body. Despite the educational programs already conducted in primary schools in the field of physical activity and healthy eating, the number of people struggling with lifestyle diseases is increasing year by year, unfortunately it concerns younger and younger people. The aim of the study was knowledge about the influence of lifestyle and body composition on dehydration and body pH of physiotherapy students.

Material & Methods:

The study involved 50 physiotherapy students, 25 women and 25 men aged 22 to 26. In order to characterize the research material, a study was carried out using the diagnostic survey method, using the author's own questionnaire technique. In order to assess body composition, the TANITA device was used, while to check the level of hydration and pH of the body, a specialized device for diagnostics and therapy using electromagnetic vibrations – Bioresonance Quantum Pro+.

Results:

Among the surveyed group, ¼ of the students were characterized by a physically inactive lifestyle, the rest of the respondents were physically active or very active. With the increase in the level of active lifestyle, the percentage of body fat, BMI, metabolic age, adiposity of internal organs decreased, and the percentage of water in the body increased, and dehydration decreased. The increase in body weight, increase in adipose tissue, adiposity of internal organs, higher BMI and lower metabolic rate influenced the decrease in pH value. In turn, the increase in pH resulted from an increase in the amount of water in the body. The higher the physical activity of the subjects, the lower the metabolic age and the better the metabolism, which is the greater the more water there is in the body.

Conclusions:

The study proved that dehydration decreased with an increase in active lifestyle, while the level of dehydration among students increased with an increase in body weight and/or body fat. Similar results apply to the acidification of the body - the higher the body weight and/or more body fat, the more the pH decreased in the study group, while the pH increased with the increase in water in the body.

Key words:

acid-base balance • acidification • dehydration • physical activity

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Conflict of interest:

Author has declared that no competing interest exists

Ethical approval:

The study was approved by the local Ethics Committee

Provenance & peer review:

Not commissioned; externally peer reviewed

Source of support:

Departmental sources

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Physical activity – noun

exercise and general movement that a person carries out as part of their day [24].

Dehydration – noun

a dangerous lack of water in the body resulting from inadequate intake of fluids or excessive loss through sweating, vomiting or diarrhoea [24].

Irrigation – n. the process

of washing out a wound or hollow organ with a continuous flow of water or medicated solution [25, p. 347].

pH – a measure of the concentration of hydrogen ions in a solution, and therefore of its acidity or alkalinity. A pH of 7 indicates of neutral solution, a pH of below 7 indicates acidity, and a pH in excess of 7 indicates alkalinity [25, p. 501].

Acid-base balance – the balance between the amount of carbonic acid and bicarbonate in the blood, which must be maintained at a constant ratio of 1:20 in order to keep the hydrogen ion concentration of the plasma at a constant value (pH 7.4). Any alteration in this ratio will disturb the acid-base balance of the blood and tissue and cause either acidosis or alkalosis. The lungs and the kidneys play an important role in the regulation of the acid-base balance [25, p. 6].

Sten – A sten score indicates an individual's approximate position (as a range of values) with respect to the population of values and, therefore, to other people in that population. The individual sten scores are defined by reference to a standard normal distribution. Unlike stanine scores, which have a midpoint of five, sten scores have no midpoint (the midpoint is the value 5.5). Like stanines, individual sten scores are demarcated by half standard deviations. Thus, a sten score of 5 includes all standard scores from -0.5 to zero and is centered at -0.25 and a sten score of 4 includes all standard scores from -1.0 to -0.5 and is centered at -0.75. A sten score of 1 includes all standard scores below -2.0. Sten scores of 6-10 "mirror" scores 5-1 [26].

INTRODUCTION

Health is a prerequisite for a high quality of life for every human being. It guarantees physical and intellectual fitness in all areas. Currently, many diseases have no visible symptoms and wreak havoc on the body, and people very often underestimate preventive examinations, healthy eating habits, controlling emotions, taking care of the mind and body [1-3].

One of the most important pro-health behaviours that have a huge impact on the lifestyle of each individual is physical activity. It helps fight and prevent many diseases, shapes motor skills, keeps the body in a healthy condition, improves self-esteem and well-being [4-6]. Wojciech Oczko's [7] famous saying refers to this: "Movement can replace almost any medicine, while no medicine can replace movement".

The most important component in the body of every human being, thanks to which a number of important processes occur, is water, which should constitute about 60% of the total body weight, and its deficiency can lead to many disorders such as dehydration, mental and physical insufficiency [8-10].

The body functions properly in an alkaline-acid environment, and thanks to the acid-base balance (see glossary), the proper course of processes occurring in the body at the cellular, tissue and organ level is possible. Long-term acidification leads to serious havoc in the entire human body and promotes the formation of cancer [11-13].

Physiotherapy students, as members of the health science community, should have extensive knowledge of a healthy lifestyle and how to help themselves and ensure vitality to the body. The aim of the study was knowledge about the influence of lifestyle and body composition on dehydration and body pH of physiotherapy students.

A research question was formulated: what is the relationship between lifestyle and body composition indicators with hydration and body pH?

MATERIAL AND METHODS

The study involved 50 (25 women and 25 men) physiotherapy students aged 22 to 26. The average age of the surveyed students was 24 years.

The average body weight of the study group was 71.8 kg, and the height was 169.8 cm.

Research was carried out using the diagnostic survey method, where the questionnaire technique was used. The self-constructed questionnaire included questions about lifestyle and demographic data.

The following measurements were carried out:

assessment of body composition using the TANITA device. It is a scale that is used to analyse body composition using the BIA method. There are special electrodes on the scale platform and on the hand grip that send low-intensity electrical signals to the body that are safe and imperceptible to the subjects. [14, 15]. The tested person stands on the device (without socks) placing his feet on the electrodes located on the scale platform, the tested person takes the electrode holder in his hand and the measurement takes place. The overall analysis takes about 20 seconds. The following data were used from the measurement: body weight, percentage of body fat, visceral fat, metabolic age, muscle mass, and BMI [15].

Evaluation of hydration and pH using a specialized device for diagnostics and therapy using electromagnetic vibrations – Bioresonance Quantum Pro+. It is a non-invasive device that analyses human cells using an electromagnetic field and can help in developing the health situation of the examined person and his main problem [16, 17].

The examination with this device consists in capturing information from cells, it is based on non-linear processes, frequency modulation and inducing the phenomenon of resonance. The electromagnetic field energy and frequency are measured by a sensor in the hand [18, 19].

The subjects were informed to fulfil the following recommendations before the examination: 3 hours after a meal; last physical activity at least 2 hours before the measurement. Before the examination, remove all metal objects from the body – rings, watches, earrings; the mobile phone should also not be located near the research station. The examined person holds a magnetic sensor connected to the device in his hand, and the teacher starts the examination by following the instructions of the program on the computer. The measurement takes about 3 minutes [17].

The tests used only the indicators from the "General physical condition" report – dehydration and pH. The above measurements were made once.

For the purposes of this analysis, an active lifestyle scale was developed and validated, consisting of 5 items constituting questions 3-7 of the own questionnaire. In the reliability test of this scale, the Cronbach's alpha in the tested material of 50 respondents was 0.59, which is a result that allows the scale to be used. The raw score of the active lifestyle scale is the sum of the points obtained. The raw score was converted to a sten (score) scale, on the basis of which the level of lifestyle was determined: physically inactive (1-4 sten), physically active (5-6 sten) and very active (7-10 sten).

Interpretations of body composition measurements on the TANITA scale, bioresonance as well as raw and calculated results of the active lifestyle scale are based on the distribution indicators: arithmetic mean, standard deviation, range, the smallest value and the largest value.

The occurrence of dependencies between the analysed indicators was assessed with the Pearson linear correlation.

The influence of lifestyle in terms of physical activity on the level of the measured indicators of body composition and general physical condition analysed using a one-way ANOVA analysis of variance. The results for which the level of significance was less than or equal to 0.05 ($p > 0.05$)

were considered statistically significant. Lack of statistical significance was denoted in the graphs by the abbreviation NS (Statistically insignificant).

RESULTS

Of the 26% surveyed students led a physically inactive lifestyle, 42% of the respondents led a physically active lifestyle, and 32% of the respondents led a very physically active lifestyle (Figure 1).

Half of the surveyed students believed that it is active, including: 6% they lead a definitely active lifestyle and 44% rather lead an active lifestyle. Lifestyle sometimes active sometimes not active was led by 34% of the respondents, and 8 of the respondents (16%) believed that their lifestyle was not physically active.

The percentage of body fat in the study group of physiotherapy students was on average 23.1 and ranged from 6.7% to 40.1%. In more than half of the respondents it was higher than 69.8%, whereas 52% of the subjects were underweight, 32% of the subjects had a healthy percentage of body fat, and 16% of the physiotherapy students were overweight or obese. The average BMI in the study group of physiotherapy students was 23.9 kg/m² and ranged from 18.1 kg/m² to 32.1 kg/m². Normal BMI was found in 68% of the surveyed students, 24% of the surveyed were overweight and 8% of the surveyed physiotherapy students were obese.

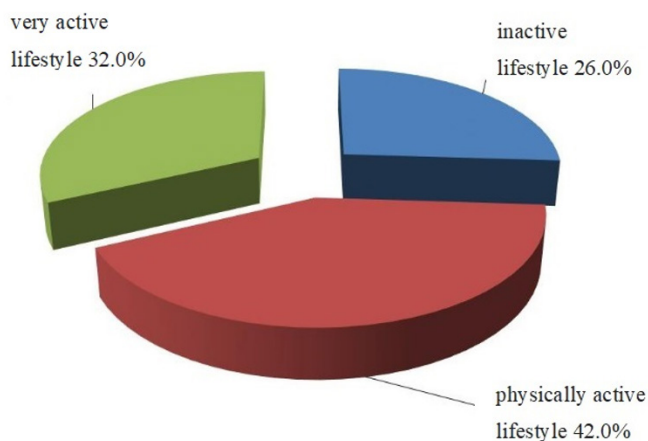


Figure 1. Leading an active lifestyle in the self-assessment of the surveyed physiotherapy students.

More than half (62%) of the subjects had poor metabolism. The percentage of water in the body of the examined physiotherapy students was on average 57.1% and ranged from 46% to 69%. In the study group, the percentage of water in the body was normal in 82% of students. The average level of dehydration in the study group of physiotherapy students was 34,744 and ranged from 32,257 to 36,825. This level was slightly above the norm in 30% of the surveyed students. The average pH value in the study group of physiotherapy students was 3.190 and ranged from 2.612 to 3.719. Acidic pH occurred in 98% of the surveyed students.

Dehydration correlated statistically significantly ($r = -0.416, p = 0.003$), inversely with the level of physically active lifestyle. Other indicators of general physical condition did not correlate with the level of physically active lifestyle (Figure 2). As the level of physically active lifestyle increased, dehydration decreased (Figure 3).

A statistically significant correlation was found, directly proportional between dehydration and body fat percentage ($r = 0.396, p = 0.004$) and inversely proportional between dehydration and body water percentage ($r = -0.337, p = 0.002$). With the increase in the percentage of body fat, dehydration increased in the study group of physiotherapy students. There was also a statistically significant, inversely

proportional correlation between pH and body weight ($r = -0.490, p < 0.001$), body fat percentage ($r = -0.351, p = 0.012$), BMI ($r = -0.630, p < 0.001$), metabolic age ($r = -0.560, p < 0.001$), metabolic rate ($r = 0.556, p < 0.001$), fatness of internal organs ($r = -0.558, p < 0.001$) and directly proportional between pH and the percentage of water in the body ($r = 0.349, p < 0.001$). With the increase in body weight, the pH decreased in the study group of physiotherapy students, as well as in the case of an increase in adipose tissue (Figure 4).

With the increase in adiposity of internal organs, the pH decreased in the study group of physiotherapy students, while with the increase in the percentage of water in the body, the pH increased in the study group of physiotherapy students.

A statistically significant, directly proportional correlation was found between the level of metabolism and the level of physically active lifestyle ($r = 0.539, p < 0.001$) and the percentage of water in the body ($r = 0.811, p < 0.001$). There was a statistically significant inversely proportional correlation between the level of metabolism and body weight ($r = -0.505, p < 0.001$), body fat percentage ($r = -0.768, p < 0.001$) BMI ($r = -0.722, p < 0.001$), and adiposity of internal organs ($r = -0.860, p < 0.001$).

In the study group of physiotherapy students, lifestyle had a statistically significant (from the

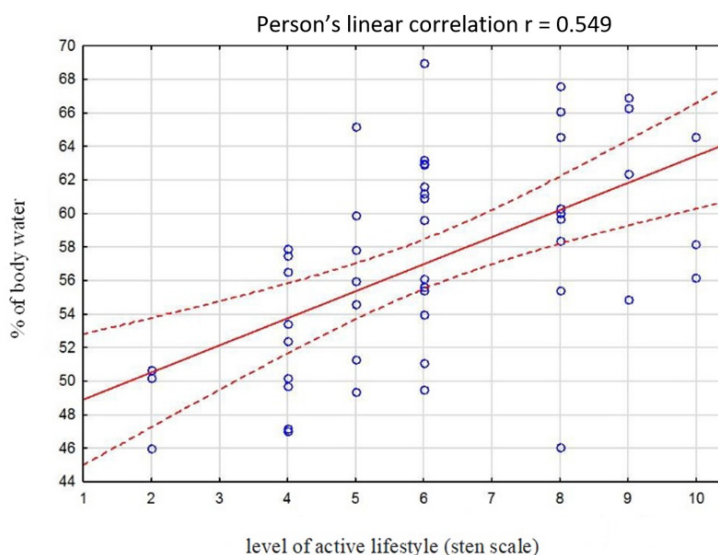


Figure 2. Level of physically active lifestyle vs. percentage of water in the examined group.

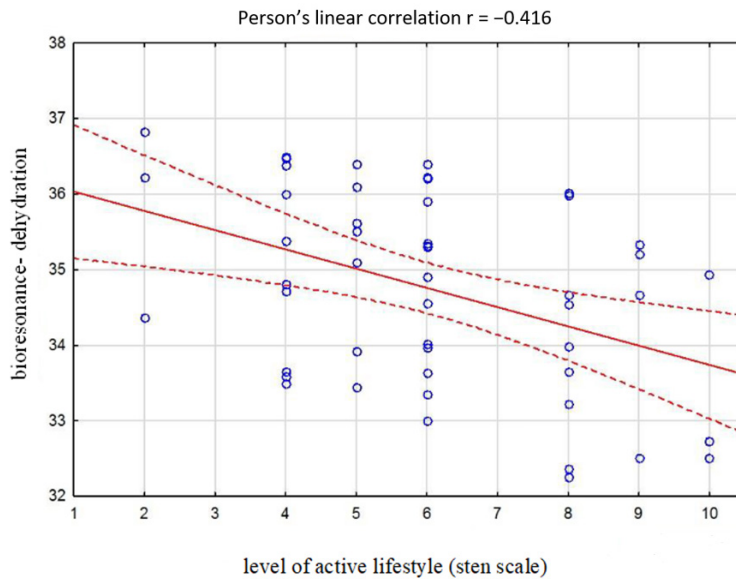


Figure 3. The level of a physically active lifestyle and the level of dehydration in the study group of physiotherapy students.

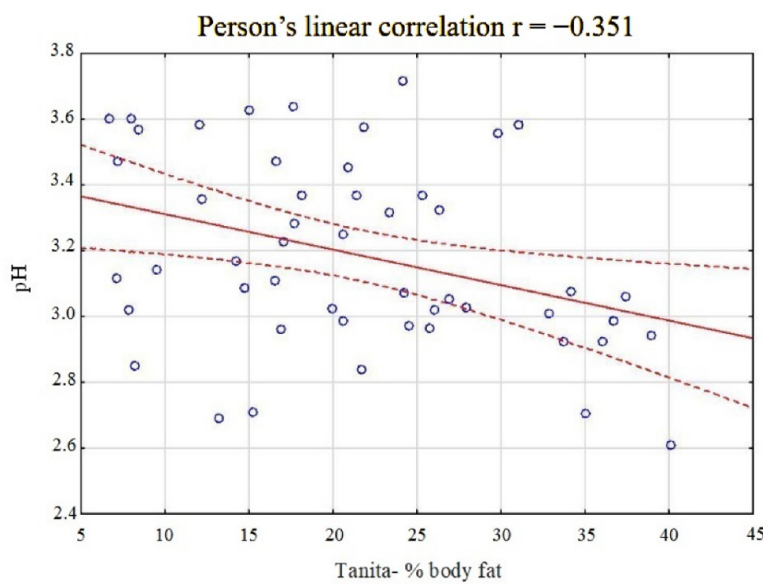


Figure 4. pH and the percentage of adipose tissue in the study group of physiotherapy students.

ANOVA test $p < 0.001$) effect on the percentage of body fat. The highest level of the percentage of body fat was found in the group of students who were not physically active and the lowest in the group of students who led a very physically active lifestyle (Figure 5).

In the study group of physiotherapy students, lifestyle had a statistically significant (from the ANOVA test $p < 0.001$) effect on the percentage of water in the body. The smallest percentage of water in the body was found in the group of students who were not physically active and the highest in the group of students who led a very physically active lifestyle.

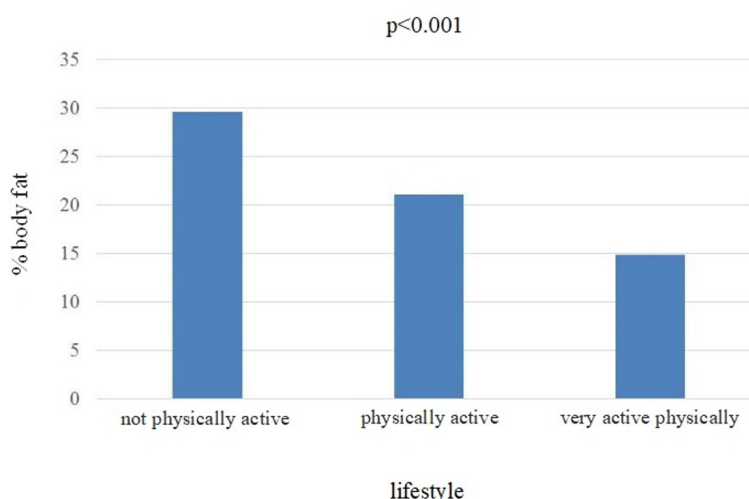


Figure 5. The influence of lifestyle on the percentage of body fat in the study group of physiotherapy students.

DISCUSSION

Lifestyle has a huge impact on human health. Rational nutrition, physical activity, ensuring mental and physical balance, and personal hygiene are its components.

In the study group, the average level of physical activity on the sten scale was 6.1 sten, so it was in the upper level of the middle range (physically active lifestyle). 26% of the surveyed students led a physically inactive lifestyle, 42% of the respondents led a physically active lifestyle, and 32% of the respondents led a very physically active lifestyle.

Romanowska-Tołoczko obtained similar results in studies evaluating the activity of students of the University of Physical Education in Wrocław, where 58% of respondents rated their physical activity very highly [20]. Of the 68% surveyed students had a normal BMI, while 24% of the surveyed were overweight and 8% of the students were obese. This result highlights the fact that 1/3 are overweight and obese, which may result in health problems in later years. According to the Country Integrated Non-Communicable Disease Intervention (CINDI) study, which was conducted among Poles aged 25-64, as many as 51% of men and 53% of women are overweight, which poses a risk of developing obesity-related diseases [21]. In own research, a relationship was found between lifestyle and body composition indicators, and dehydration and acidification of the body. Systematic exercise is the

basic element of counteracting and comprehensive treatment of obesity. The positive impact of physical activity was investigated in their works by, among others, Plewa and Markiewicz [22] as well as Chabros et al. [23].

Most of the students who took part in the study are physically active, and most of them try to lead a healthy lifestyle, but there are also people struggling with overweight and the beginning of obesity, and they are also characterized by low physical activity. Studies have also shown that a lot of students have a problem with an acidified body.

At the moment, there are no studies in the literature on the relationship between lifestyle, body composition and hydration and body pH. The results obtained in the study encourage their continuation on a larger scale and in different age groups.

CONCLUSIONS

The study proved that dehydration decreased with an increase in active lifestyle, while the level of dehydration among students increased with an increase in body weight and/or body fat. Similar results apply to the acidification of the body – the higher the body weight and/or more body fat, the more the pH decreased in the study group, while the pH increased with the increase in water in the body.

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Cite this article as: Chmielak P. Lifestyle and body composition on irrigation and pH of physiotherapy students. *Arch Budo Sci Martial Art Extreme Sport* 2021; 17: 95-101