THE EFFECTS OF REGULAR PHYSICAL EXERCISE ON THE HUMAN BODY

Abstract
Regular physical activities should be an integral part of an active lifestyle and the proper use of one's time. Programs including such activities are more effectively being applied in the prevention and elimination of health problems, especially those that are the result of decreased movement, inadequate nutrition and excessive nervous tension. Numerous studies have revealed new information about the link between physical activity and quality of life. Each person would have to be involved in physical activity of moderate intensity most days for 30 to 60 minutes, because active people are more healthier and have higher endurance levels, have a positive attitude towards work and cope with everyday stress better. Activity helps you look better, makes you happier and more vital. Studies have clearly shown that physical activity affects health and reduces the risk of many diseases. An active life increases energy, vitality, helps change bad habits, improves health, and strengthens one's energy and desire for life. The aim of this study was to determine the effects of regular physical activity on the human body. The subject matter of this study is the collection and analysis of results which the authors of various studies have obtained. The reviewed literature was collected using a web browser, and consisted of research work available in the Kobson database, through Google Scholar and in journals available in the field of sports science. The method of treatment is descriptive because the studies involved a variety of training programs, people of different ages, and tests carried out by different measuring instruments, so there is no possibility of a comparison of the results by other means.

Key words: PHYSICAL ACTIVITY / HEALTH AND EXERCISE / AGING

INTRODUCTION

Regular physical activity should be a part of an active way of life and the proper use of one's time. Each individual is able to freely opt for suitable forms of sports-recreational activities and choose a time and place for them. A man is the subject and bearer of his activities, and can opt for one or more forms, whether regular or occasional activities, and could take part in them of his own volition, or with professional help and instructions from professionals. In their daily free time, people usually do the following: morning exercise, walking, light running, cycling, swimming and other activities in the immediate surroundings of their residence (Mikalački, 2005). Sports-recreational activities are very effective and an appropriate means for improving health and fulfilling the biological needs for movement. Physical activity reduces asocial forms of behavior, problems with addiction and improves human relationships (Krivokapić, & Popović, 2011). Programs including sports-recreational activities are being more and more effectively applied in the prevention and improvement of health issues, especially those which are the result of hypokinesia.
Health is the first and foremost value of human life and is more than the mere absence of illness, since healthy people are usually free of any pressure of illness, anxiety and depression. The length of one's life is not only determined by their genes, but is also influenced by other factors, such as work and living conditions. The health of modern man is mostly endangered by insufficient physical activity, an excessive and inadequate diet, stress, a polluted working and living environment and damaging habits.

THE THEORETICAL BACKGROUND

The methodology

The literature needed for this overview was compiled using internet search engines, articles available through the Kobson database, Google Scholar and journals available from the field of sports science, using key words: physical activity, health, exercise.

The aim of this study was to determine the effects of regular physical exercise on the human body. The subject matter of the study was to collect research, and analyze the results and conclusions which the authors reached. The data processing method was descriptive, as a result of the fact that the studies deal with various types of exercise programs, various age groups, and the testing was carried out using various measuring instruments, and so it is not possible to compare results using different methods.

An active lifestyle as a pattern of behavior

Our species, Homo sapiens, first appeared approximately 50,000 years ago. Agriculture first emerged approximately 10,000 years ago. Frequent migrations forced the first humans to lead an active lifestyle. However, things have changed since then. In the beginning, the changes were rather slow, while in the last several decades, the tempo of change has increased significantly and turned us into an inactive, sedentary population. Today less than 30% of the American population is involved in a sufficient level of physical activity (30 minutes of moderate physical activity each day), which is necessary for a healthy life (Booth, & Chkavarthy, 2002). A very small percentage of the population (approximately 10%) is involved in activities which, in addition to the sole aspect of improving health, can provide good physical condition as well. Unfortunately, only a few can understand these facts and can derive pleasure and the other advantages from an active lifestyle. People do not make the decision to start exercising, or very quickly quit the exercise program because their reason for exercising has not been explained to them properly. In addition, the choice of exercise itself is based on heart rate and other very strict medical parameters, and not on a feeling of pleasure and a sense of fulfillment and achievement.

Numerous studies have produced new data on the relationship between physical activity and the quality of life. Active individuals are healthier and have higher levels of endurance, have a positive attitude toward work, and deal better with everyday stress. Active elderly individuals are more satisfied with life, depend less on others and are healthier (Weinberg, & Gould, 2003). People led a healthier life and were more active before they began to enjoy the benefits of a life filled with technological advancement such as the computer, TV, cars and other modern devices which make human life easier. These modern inventions of the human mind today make it possible for the daily expenditure of energy to be reduced to the pressing of buttons and issuing voice commands to a machine, which has become enough to satisfy the basic human needs to for self-expression, work and entertainment. At the same time, with a decrease in the need for man to work, there is more and more intake of processed, high-calorie food and fast food. Fast food restaurants and shops are growing and expanding, while at the same time, the interest for physical activity is declining. Taken individually, the lack of physical activity and the increase in the use of high-calorie food should not be a significant problem. However, if viewed globally, especially over the last few years, we can see an alarming increase in the number of illnesses which are related to this kind of lifestyle. Luckily, it is still not too late to change this kind of pattern of living.

It has been known for a long time that the level of physical activity is related to education and financial possibilities. Does that mean that just because one
has become more active they will become increasingly intelligent or that their income will increase? Probably not, but studies which compare the connection between health and success among the leaders of some of the best corporations and the average citizens have shown that the leaders had, on average a 5.4 kg less and that they had been married for longer periods of time. Furthermore, they all cited physical activity as the best weapon for fighting stress (Edstrom, 1999). Stone & Klein (2004) reached the conclusion that people who exercise regularly not only improve their health and fitness level, but what is more important, are filled with a sense of pleasure and internal strength, which has a positive effect on all the other spheres of their life. Fiery fitness instructors often use phrases such as no pain no gain, we exercise till we drop or if it doesn’t hurt, you’re not doing it right. Of course, none of these slogans are applicable to the concept of health and exercise. No unpleasant sensation, pain, burning sensation in our muscles or any similar state should be the ultimate goal of physical exercise. An active lifestyle does not mean giving up and going without, or enduring pain or unpleasantness. Exercise is a pleasurable experience, a confirmation of what we can actually do, what we can be – physically, mentally, socially and spiritually strong individuals. An active lifestyle gives us energy, the life force to endure the struggle which lies before us. It decreases one’s self-focus, changes negative habits, improves our health, strengthens our energy levels and our desire to live.

The beneficial effect of sports-recreational activities on the human body

It was back in 1993 that a group of well-known experts recommended physical activity and health. They questioned the results of the latest scientific research and agreed that each individual should take part in moderate physical activity almost daily for 30 to 60 minutes. Various types of activities are recommended for this purpose, walking, riding a bicycle, brisk walking, jogging, swimming, but also fieldwork, dance and the like. The recommendations make a note of a specific example of meeting the set standards – brisk walking for 3.2 km - but those who are not involved in any kind of physical activity should begin with several minutes of daily activities so that they could progress gradually, until they reach the desired level of 30 minutes (Pate, Pratt, Blair, Haskell, & Macera, 1995).

These instructions have somewhat been altered, so that the experts have increased the minimum 30 minutes to 60 minutes of moderate physical activity. They doubled the recommendation in order to increase calorie expenditure and thus slow down the obesity epidemic (Brooks, Butte, Rand, Flatt, & Cabellaro, 2004).

The effect of sports-recreational activities on cardiovascular disease

Numerous studies have up to now indicated that the risk of cardiovascular disease is undeniably linked to the extent of regular physical exercise, as well as the fact that this physical activity needs to be continual and without significant interruptions so as to achieve the desired results. Participation in school sports activities, or in sports activities during youth, does not provide protection during one’s entire life. Irrespective of whether they were active in their youth, adults who exercise regularly have a lower risk of cardiovascular disease. In one study, it was concluded that physical activity requiring 1.000 kcal a week is linked to the satisfyingly low level of coronary disease and that the low level of risk lasts for a longer period. Spending 2.000 kcal a week is connected to additional positive effects, especially regarding the values of HDL and maintaining optimal body weight (Drygas, Kostka, Jegier, & Kunski, 2000). A study on the health habits of 84.129 nurses has shown that the guidelines for a healthy lifestyle which include regular exercise, a proper diet and not smoking, is directly linked to a low degree of risk for coronary disease. The parameters based on which the women were classified in the category of lower risk individuals are the following – 30 minutes of moderate to intensive physical activity each day, no smoking, staying within the guidelines of one’s BMI³ values, consuming, on average, half a glass of alcoholic beverages each day and consuming food rich in dietary fiber, and poor in saturated fats and simple sugars. Women classified in the group of individuals with a low-level risk factor for coronary disease had a 17,8% smaller risk than the average population (Stampfer, Hu, Manson, Rimm, & Willett, 2000). Hypertension, which is the chronic high level of arterial blood pressure, above the level found in
healthy individuals, contributes to the heart working under strain since the blood is expelled from the left ventricle with significant difficulty. This condition leads to an enlarged heart over time, and arteries and arterioles in the human body become hard and less elastic, which leads to arteriosclerosis, a weak heart, heart attack and kidney problems (Wilmore, & Costil, 2008). Any activity which decreases blood pressure, decreases the load on the heart muscle. It has been proven that regular physical exercise decreases blood pressure among middle-aged and elderly individuals, especially those with high blood pressure. In terms of the kind of physical activity involved in the prevention of hypertension, what is primarily recommended are the so-called aerobic activities, such as brisk-walking (a brisk, even-paced walk at a speed of 5-6 km/h), riding a bicycle, swimming, jogging, that is, those physical activities which are based on the stereotypical repetition of movements which involve the larger muscle groups, as well as the cardiovascular system (Mujović, & Čubrilo, 2012). The brisk-walking type of walking is the simplest, but also the safest activity which almost anyone can take part in, with almost no counter indications. Brisk walking leads to an increased secretion of endorphins and serotonin which help improve one's mood and are very important for motivation. The basic advantage of brisk-walking includes systematic effects on the metabolism (it speeds up the basal metabolism), the skeletal system (it helps prevent osteoporosis, and unlike jogging, there is no danger of the joints being overloaded), and especially the cardiovascular system (it strengthens the heart, increases the elasticity of the blood vessels, regulates blood pressure, lowers cholesterol). Many authors deal with the possible reasons for achieving better results through aerobic exercise, as compared to load exercise. Aerobic physical activities, such as walking, riding a bicycle, climbing the stairs are all activities which can be realized at any time of day or night and in any location, while load exercise often requires and includes a trip to a certain location (fitness center), which can influence commitment to this type of physical exercise, and thus the regularity of exercise. “Endurance training leads to the decrease in the value of blood pressure during submaximum intensity of physical activity, while during maximum physical activity systolic blood pressure is increased, and diastolic pressure is lowered in comparison to pre-training values” (Radovanović, 2009). Exercise helps to improve the health of people with various forms of cardiovascular disease, and even decreases the risk factors. The studies clearly indicate the need for the regular control of blood pressure. Aerobic training, combined with a decrease in body weight, is recommended with the treatment of increased blood pressure of sedentary and obese individuals (Bhimenthal, Sherwood, Gullette, Babzak, & Waugh, 2000). High blood pressure can harm the artery walls and lead to the development of arteriosclerosis, while increased pressure to the wall of the blood vessels increases the risk of rupturing and the leakage of blood into the surrounding tissue, as in the case of a stroke. Even though excessive intake of salt, obesity and stress can speed up the process, the reason for the onset of these problems cannot be noted easily and in more than 90% of all cases, the origin of hypertension cannot be determined. Individuals with very high blood pressure (exceeding 160/95 mm Hg) run a risk which is three times greater for coronary disease and which is four times greater for sudden heart failure than other people. The values of resting blood pressure greater than 130/80 mm Hg are related to an increased risk of coronary disease in middle age and even later on in life (Vasan, Larson, Leip, Evans, & O’Donnell, 2001).

Jeffrey, Wjack, & Anthony (2008) carried out a study which lasted for 12 weeks, on a group of 45 elderly men, aged 70, who were divided into three groups. The first group was subjected to speed and strength training, the second to endurance training, while the third group was a control group. Based on the results, they reached the conclusion that speed training has a far greater influence on the fitness level of the elderly in comparison to classic training. Angelia, Rond, Arneatha, & Donna (2006) compared the values of arterial blood pressure of African Americans following exercise which lasted for nine months, and obtained results that, in the beginning 70% of them had high blood pressure, in the end, only 43% of them had high blood pressure. They reached the conclusion that community activities could help decrease hypertension among African Americans. Patricia, Elmer, Eva, Wiliam, & Lawrence (2006) attempted to use all-encompassing interventions in the behavior of adults to improve their life cycle and decrease the value of their arterial blood pressure. In four clinical centers, during a period of 18 months, the effect of two multi-component interventions in behavior in relation to the advice given on hypertension, changes in
The effects of sports-recreational activities on obesity among humans

Regular physical activity burns up calories and helps you maintain your target weight, the optimal percentage of bodily fats and a slender and healthy figure. Exercise increases the amount of energy obtained from fatty tissue in relation to carbohydrates while we are at rest or during moderate activity. Individuals who are physically healthy have a greater ability to burn fatty tissue – since there is an increase in the ability to use fatty tissue as an energy source - and additional positive effects are strongly connected to the decrease in risk of arteriosclerosis and coronary disease. An increase in weight which leads to obesity can only be the result of an energy disbalance, which means that the intake is greater than the expenditure of energy over a certain period. At the same time, the loss of body mass, that is, weight loss, takes place when the expenditure of energy is greater than the energy intake. This means that, when the intake and expenditure are balanced out, the body mass remains unchanged. Since gaining and losing weight are the function of the energy balance, the prevention of obesity could in theory be achieved through changes, the dietary intake of energy, and physical activity. Variables, such as the daily duration of activity, the weekly frequency and intensity, ultimately determine energy expenditure and the potential loss of weight. Regular physical activity burns calories and helps you maintain your desired weight, the optimal percentage of body fat and a slender and healthy figure. Training which leads to an increase in physical fitness also increases the part that fatty tissue plays in the energy metabolism. Exercise increases the amount of energy obtained from the fatty tissue in relation to the carbohydrates while at rest or during moderate activity.

A physically healthy individual has an efficient “furnace” for burning fatty tissue, and their ability of using fatty tissue as an energy source increases, while the additional positive effects are strongly bound to the decrease in the risk of arteriosclerosis and coronary disease. It was even confirmed that physical activity decreases the risk of the occurrence of a gall bladder stone, not to mention other risk factors, such as obesity or sudden weight loss (Leitzmann, Rimm, Willett, Spiegelman, Grodstein, 1999). The results of some studies indicate that good physical condition reduces the risk of excessive physical weight and that men who are suffering from excessive weight, but
who are in good physical condition, have a smaller mortality rate than people with normal weight, but with a lower level of physical fitness (Lee, Jackson & Blair, 1998). Most obese individuals that we can see in one family can be the consequence of both heredity and the influence of the environment. Individuals suffering from excessive weight eat more and more and exercise less and less, and probably transfer the same lifestyle on to their children. The fatty tissues located in the abdomen around the organs cannot unfortunately be measured like the skinfolds which are below the abdominal muscles. Researchers measure the relation between the volume of the hips and the waist in order to determine why the existence of the fatty depot in that region increases the risk of heart disease, hypertension, stroke, diabetes and certain malignant illnesses. Fatty tissue within the abdominal cavity is deposited around the organs which have a direct relation to the liver by means of circulation. Fatty tissue in that region is prone to releasing free fatty acids directly into the liver, where they can be used for the synthesis of cholesterol. Whatever the reason, this fatty tissue represents a risk, and we know that physical activity is an effective way of reducing the amount of metabolically active fatty tissue, especially among men (Trichopoulou, Ginardellis, Laggiou, Benetou, & Naska, 2001). In all the BMI categories, individuals with the greatest waist volume have an increased tendency for hypertension, diabetes, increased amounts of fat in the blood and metabolic syndrome, in comparison to individuals with a normal waist volume (Janssen, Katzmazyk, & Ross, 2002). It is clear that the decrease in weight loss through the reduction of food intake is connected to decrease in energy consumption, and such a state additionally makes the change in body weight difficult (Leibel, Rosenbaum, & Hirsch, 1995). More and more people are becoming obese since their daily energy expenditure is decreasing, and most people are not decreasing their intake of food so as to balance their lifestyle with low energy needs (Hil, & Melanson, 1999). A study carried out on 24 women confirmed that the combination of a proper diet and activity is more effective, both for the decrease of fatty tissue and the preservation of muscle tissue, than any diet (Ross, Pedwell & Rissanen, 1995). The aforementioned studies clearly indicate that physical activity is needed to control weight. Calorie restriction can be used to lose weight, but this weight loss is followed by the loss of protein (muscle tissue) and water. People with a weaker level of physical fitness tire more easily during any activity, which decreases the possibility of their spending calories. As their physical fitness improves, so does their calorie expenditure since the activity is more intense, more frequent and lasts longer. The increase in physical condition undoubtedly contributes to greater energy expenditure and better weight control. Some studies of the effects of training have confirmed that training has a significant influence on the sense of tiredness and exhaustion on the part of the participants (Gaskill, Walker, Bouchard, Rankinen, Rao, & Skinner, 2005). As their physical fitness improves, a person can do more without getting tired and without an increase in heart rate. The reduction of body mass through physical activity, without any restrictions of energy intake, is quite modest (Garrow, & Summerbell, 1995). On the other hand, most authors emphasize the importance of physical exercise in the prevention of obesity (Saris, 1998; Jeffery, Epstein, Wilson, Drewnowski, & Wing, 2000).

The effect of sports-recreation activities on mental health

In studying the effects of physical activity on mental health, a logical question presents itself: does physical activity depend on mental health or does mental health depend on physical activity? Are happy and content people, those who are not depressed and nervous, interested in, have the energy and strength to be active? The results of some studies indicate that the level of physical activity and good mental health share a positive correlation. The studies show that moderate physical activity has a greater effect than high-intensity exercise, that the positive effects of the activity last for a period of weeks, and thus that the improvement occurs independently of age and overall health. Irrespective of the age and gender of the participant, the statistical data indicate that physical activity significantly decreases depression. Physical exercise significantly decreases the extent of the depression in all age groups irrespective of their physical fitness level. The effects of exercise in the aerobic zone on the cycle ergometer and treadmill contribute to an improvement in the state of the participants who were suffering from a severe form of depression (Bauer, Varahram, Proest, & Halter, 2001). The positive effects of physical activity were more pronounced...
among participants who trained more often and were more often involved in recreational training programs (North, McCullagh, & Tran, 1990). The effects of physical activity did not depend on the age of the participants. It was determined that children and teenagers who are physically more active were not as depressed (Motl, Birnbaum, Kubik, & Dishman, 2004) and that physical activity decreases the risk of the onset of depression later in life (Strawbridge, Deleger, Roberts, & Kaplan, 2002). Even though some researchers stated that exercise improves the aerobic ability of the participants to decrease depression, the results of certain studies did not support this hypothesis. A study carried out on women indicated that even a low level of activity has a positive effect on mental health (Kull, 2003).

The effect of sports-recreational activities on the aging process

The process of aging and a sedentary lifestyle contribute to the decrease in elasticity and permeability of large arteries. As a result, there is an increase in systolic blood pressure, which increases the risk of a thrombus becoming loose and a heart attack. Certain studies (Seals, 2003) have shown that regular aerobic training can, based on one’s age, have a positive effect on the increase in arterial permeability. People who begin and continue a program of moderate physical activity can improve arterial permeability and decrease the possibility of a myocardial infarction (a heart attack). People who exercise regularly, even those whose general fitness level is not very high, have higher arterial permeability than sedentary individuals (Ferrera, Twisk, VanMechelen, Kemper, & Stehouwer, 2002). Researchers have determined that physical activity stimulates and protects brain function. Physically active people learn better and remember things longer, since physical activity decreases the age-related degeneration of the brain. The latest studies have shown that elderly people who train three or more times a week rarely suffer from Alzheimer’s disease and age-related dementia. People who exercised regularly had a 30-40% smaller risk of developing dementia. It was noted that even light physical exercise, such as walking, helps to postpone the first symptoms of this disease (Larson et al., 2006).

CONCLUSION

In this paper, we attempted to give an overview of how many different aspects make up an active lifestyle, the interdependence and influence of these aspects, as well as the influence of such a pattern of behavior on the overall lifestyle. Physical activity helps maintain muscles that burn energy, helps maintain body weight within the proper guidelines and represents a basic means of stress control. Of course, activity helps us look better, makes us more vital and decreases our sense of exhaustion. Research clearly indicates that physical activity influences an improvement in health and decreases the risk of coronary disease, hypertension, a stroke, as well as certain malignant illnesses, diabetes, osteoporosis, obesity and other chronic illnesses. Through the systematic involvement in sports-recreational activities of a suitable nature, extent, intensity of load and optimal frequency, significant effects are achieved in terms of metabolism regulation, an increase in functional abilities, the stability of the internal gland system, strengthening of the contractile force of the myocard, increased elasticity of the blood vessels... There are additional positive effects which occur if we regularly take part in physical activity and maintain an optimal fitness level.

REFERENCES


AUSWIRKUNGEN REGELMÄSSIGER KÖRPERLICHER AKTIVITÄTEN
AUF DEN MENSCHLICHEN ORGANISMUS

Zusammenfassung

Schlüsselwörter: KÖRPERLICHE AKTIVITÄT / GESUNDHEIT / ÜBUNG

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