

Cycling and the physiological effects

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Abstract

Cycling is a physical activity that has been practiced for a long time in Brazil and in the world since the appearance of the vehicle called the bicycle, and since the mid-nineteenth century, people have already noticed some remnants of the benefits that pedaling could offer to man. At the beginning of the history of the bicycle it was used for various purposes related to the means of transport and, over time, it was recognized as a physical activity and even as a sport. The term cycling as “the art of pedaling” and “the sport of bicycle racing”, because initially shortly after its creation, the bicycle was considered a means of transport of noble refinement that was restricted to the male figure. Over time, women were conquering their space and overcoming prejudices about their participation in the modality.

Keywords: Cycling; Physical activity; Physiological effects; Hormonal system; Quality of life; Exercise

1. Introduction

Cycling understood as a physical activity is about seeking quality of life through physical practice, without necessarily having planning, structuring and repetition with intentions aimed at training, in general, practitioners' cycle in search of health, leisure, improves your cardiorespiratory skills and socializing with new people. When talking about physical activity in a group of people who practice some sport or a walk or even street cycling, it is noted that in most perceptions regarding the benefits of physical activity practiced by them, the benefits will be mentioned physiological benefits for the body and psychological benefits for the mind, such as: weight loss, well-being, socialization, quality of life, resistance, reduction of high blood pressure levels, among other benefits that are obtained simply by moving.

2. Physiological effects of cycling

Guedes and Guedes (2022) discuss the concept of exercise, which is characterized by any muscle movement that causes greater energy expenditure than at rest, therefore, the higher the level of physical activity, the greater the energy consumption. According to Pitanga, Pitanga and Beck (2019), there are many studies that discuss the importance of regular exercise for many health benefits, in this sense, cycling for exercise can provide benefits such as better functioning of body systems. present in the human body. Canali and Krueel (2001) discuss the close relationship between physical activity and the hormonal system, emphasizing that exercise acts as a stimulant for several hormones and an inhibitory factor for others. According to Santos (2013) there are 5 main hormones involved in the regulation of the energy system during exercise: catecholamines, insulin, glucagon, cortisol, and growth hormone.

GH hormone or growth hormone is secreted in large amounts during high physical activity, this is due to stimulating and inhibitory factors caused by exercise, due to the work process. The body will produce numerous opiates. By inhibiting the production of the hormone somatostatin, this hormone reduces GH release. Therefore, if physical activity increases GH levels, major benefits such as cartilage and bone growth and increased cell production will be obtained,

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encouraging thin children to exercise. and sleep control to increase height. Among the benefits of growth hormone are increased protein and greater use of fats as an energy source (CANALI and KRUEL, pp. 143-144, 2001).

The catecholamines released by the sympathetic nervous system are 80% epinephrine and 20% norepinephrine, which can vary depending on the condition of the body. These hormones are responsible for helping conduct nerve impulses to the brain and have effects such as: increased metabolism; increase the level of glycogenolysis in the liver and used muscles; increased heart rate; hypertension; increased release of glucose and free fatty acids into the blood; vasodilation in muscular arteries during exercise; vasoconstriction in viscera and skin; increased breathing rate. However, catecholamines increase during physical activity, as intensity increases, epinephrine levels increase, and during exercise, norepinephrine levels increase accordingly. This increase helps to meet the needs of physical activity, because as the heart rate increases, it redistributes the blood flow to the muscles and provides enough energy (CANALI and KRUEL, pp. 148, 2001).

Glucagon is responsible for raising blood glucose through glycogenolysis and gluconeogenesis, among the hormones involved in the release of blood glucose, glucagon is the fastest and exercise time, this hormone is the most released and aerobic activity such as cycling, the release of glucagon continues and does not oscillate, and may persist for at least 10 minutes after the end of the activity. With the opposite effect of glucagon, insulin appears, which is responsible for controlling glucose metabolism in tissues, except in the brain, since glucose is the main source of energy for the brain. Insulin is released when there is high blood sugar, such as right after a meal, and it works by replenishing glycogen stores in the muscles and liver. And during physical activity, insulin release tends to decrease, as more glucagon is released, releasing the energy needed for work (CANALI and KRUEL, p. 150, 2001).

That each type of physical activity can have varied levels of intensity, and cycling can oscillate between ups and downs. Cycling is considered an exercise that helps the body move more, as it is done in long -term paths, so Xavier, Giustina and Carminatti (2000) emphasize that, for those starting, cycling at speeds between 16 and 19 km /h is considered tempted. Lightweight, can be kept for 30 minutes in the first days, then gradually increased to 60 minutes or more, depending on each person's fitness level. According to physical activity guidelines for the Brazilian population, adults should do at least 150 minutes of light to moderate exercises per week or 75 minutes of vigorous intensity for health benefits. It should be noted that with the epidemic, the unemployment rate has increased significantly, so the more sports, the greater the benefits.

When performing a physical activity such as pedaling the cyclist arouses the physiological systems that make up the human body, from there, there are numerous chemical reactions that are responsible for the power supply to the tissues, so that muscle contraction can occur and movement to be performed concretely. Gonçalves (2018) draws attention to the first moment of aerobic activity, and it is possible to realize that there is a lack of oxygen and heart rate increases, as the body needs to understand that it has left a state of rest to an energy expenditure, Thus, it is known that the muscle needs energy to contract and move, this energy is acquired through food and from there if it has carbohydrates, proteins and lipids.

Therefore, Pinheiro (2020) presents that the systems responsible for providing energy to the muscle at the beginning of the activity are ATP-CP and glycolytic, both are anaerobic and do not depend on oxygen to produce energy, but as cycling is an exercise Cyclic and long lasting, the system that prevails is aerobic, using oxygen to generate energy through fats and carbohydrates, as this system is more effective for resynthesizing ATP at maximum intensities, allowing the cyclist to perform pedal for a long time avoiding muscle fatigue. In addition, Pinheiro (2020) points to some cardiorespiratory and musculoskeletal adaptations that aerobic cycling offers to its practitioners, such as increasing systolic volume and maximum cardiac output, increased size, and number of mitochondria's, in the amount of myoglobin and capillarization. Regarding peripheral adaptations, it was identified that by comparing individuals not trained with trained cyclists, there are differences in the type of muscle fibers, the number of capillaries and mitochondrial volume.

It is understood that each type of physical activity can have different levels of intensity, and cycling can oscillate between high and low. The bicycle is considered an exercise that helps the body move more, as done in long -term studies, so Xavier, Giustina and Carminatti (2000) emphasize that for beginners, walking at a speed between 16 and 19 km/h It is considered light, can be kept for 30 minutes in the first days, then gradually increase to 60 minutes or more, depending on the individual's fitness level. According to physical activity guidelines for the Brazilian population, adults should do at least 150 minutes of light to moderate exercises per week or 75 minutes of vigorous intensity to get health benefits. It should be noted that since this epidemic, the unemployment rate has increased significantly, so the more you play sports, the greater the benefits.

By doing physical activity such as riding a bicycle, the cyclist activates the physical systems that make up the human body, from that moment, there are many chemical reactions that are responsible for providing energy to tissues, so that muscle contraction and movement can occur. made tangible. Gonçalves (2018) draws attention to the first minute of aerobic activity, and it is possible to note that there is a lack of oxygen and heart rate increases, as the body needs to understand that it has left the state of rest in the state of energy expenditure, so you know "The muscles need energy to contract and move, this energy is obtained from food and from there you have carbohydrates, proteins and lipids."

Therefore, Pinheiro (2020) shows that the systems responsible for providing muscle energy at the beginning of the activity are ATP-CP and glycolytic, both are anaerobic and do not depend on the air to produce energy, but since cycling is exercise. Cyclic and long term, the growing system is the aerobic, which uses oxygen to produce energy from fats and carbohydrates, as this system is very efficient in recombining ATP with great intensity, which allows the cyclist to pedal for a long time avoiding to muscles. fatigue. In addition, Pinheiro (2020) points to certain cardiorespiratory and musculoskeletal adaptations that aerobic cycling provides its workers, such as increased systolic volume and cardiac output, increased size and number of mitochondria, the number of myoglobin and capillarization. Regarding peripheral dynamics, it was observed that when comparing unrecognized people and trained cyclists, there is a difference in the type of muscle fibers, the number of capillaries and the mitochondrial volume.

After analyzing samples of the vast lateral muscle, the authors found that cyclists had the highest transverse section area of types I and IIC fibers, as well as higher number of capillaries (38.7%) and mitochondrial volume (57%) per fiber muscle, when compared to detached individuals. These results indicate that aerobic training induces adaptive processes that make skeletal muscle increase its oxidative capacity, making the individual more fatigue resistant. (Rodriguez et al., 2002; apud PINHEIRO, p. 22, 2020).

It is known that during the pedaling the cyclist moves a series of muscles, Ruiz, and Oliveira (2008) point to the main muscles involved during the cadence of the pedaling, highlighting that there are two phases, the ascending and the descendant, each will recruit muscles different and consequently develop different muscle fibers.

Descendant, with pedal displacement from the upper to the lower point, requesting mainly the following muscles: maximum and medium gluteus, quadriceps (vast side, intermediate, medial, and femoral rectum), gastrocnemius and soleus; This is the phase at which the highest power development occurs. - Ascending, the pedal moves from the bottom to the upper; The main muscles requested in this movement are femoral rectum, ilium psoas, tibial ischial (femoral biceps, semitendinosus, and semimembranosus) and anterior tibial. (RUIZ AND OLIVEIRA, 2008, p. 25).

And when it comes to pedaling cadence, one can associate with the force exerted on the pedal, that is, the greater the cadence the wheel the wheel is performing, consequently the less effort the individual is making and the lower the cadence, the less Gyros the wheel is performing, however, more effort the practitioner is making (streets, Figueira and Denadai, 2007).

According to Dominiciano, Araújo and Machado (2010) there are some main physiological benefits related to aerobic activity being: increased plasma volume; hypertrophy or increased heart volume; decreased heart rate at rest; higher volume of ejection causing better myocardial contractility; increased maximum cardiac output; Increased blood oxygen extraction; Better blood distribution by more body parts; decrease in hyperventilation levels. Light aerobic activities use lipids as the main source of energy, so the lower the greater intensity will be body fat burning, while in high intensity aerobic activities, the main source of energy will be carbohydrate (Souza, p. 75, 2017).

It is noteworthy that according to the physical activity performed both aerobic and anaerobic metabolic systems may be present, the difference is that at certain times one will predominate more than the other, so it can be said that cycling is a complete activity that groups These two metabolic systems offering significant benefits to the practitioner. Anaerobic energy metabolism offers benefits like that of the aerobic system, especially they are responsible for burning calories at rest, decreased blood pressure levels and fat mass. During sprints performed on a cycling course, the body needs fast energy, so there is the predominance of the anaerobic energy system whose main source of energy is carbohydrates (Dominiciano, Araújo and Machado, 2010, p. 77).

Since aerobic and anaerobic physical activities are important to health, the difference in the route can work different or both metabolic systems, for example, the cyclist pedaling on flat ground can be said that he is performing a low intensity aerobic activity, But the moment it accelerates the cadence of pedaling giving a sprint, at this moment the predominant system will be anaerobic, or even when the terrain has many elevations the predominant system will be the anaerobic, but if the terrain is mostly Plan and the duration of the route is prolonged the predominant system will be the aerobic (Soares, 2001 apud DOMINIANO, from Araújo and Machado, 2010, p. 77).

According to Dora (1999) the act of pedaling at least half an hour per day can halve the risk of developing cardiovascular disease, diabetes, and high blood pressure. However, it is important to note that people have their specificities, and each has a level of intensity that needs to be achieved so that physical activity has a more appropriate effectiveness in preventing diseases. However, Carvalho et al. (1996) points out that after performing daily activities with relatively low intensity such as climbing stairs, walking, dancing and pedaling, it is already possible to obtain health benefits, but also comments that the combination of everyday activities with what it calls “formal programs Exercise”, can contribute to a more effective significant physical activity volume, is what can be called the exchange of habits, because the individual has the time to practice his physical activity and, in other moments of his day, for example, he You can change your car transportation through the bike or walk. It is noteworthy that in addition to providing physiological benefits for the body, cycling collaborates in various psychological aspects of its practitioner, in this sense will be discussed in the next chapter on some beneficial variables of cycling for psychological well-being.

3. Conclusion

It is concluded that cycling is one of the most famous physical activities in the world, which causes many influences in society in general, it is known that the relationship between the bicycle and man is very intimate since its creation, which leads to consider cycling as “the art of pedaling”. This famous art of pedaling was responsible for several changes in the urban space of cities, especially when it comes to the safety of this means of transport and the conditions under which the cyclist is exposed on urban roads. In addition to the transformations in the space where the bicycle is inserted, it has undergone several changes until it reached the 21st century bicycle, if the most primitive model next to the current model will be placed the differences will be very evident.

Since cycling as physical activity recruits many physiological systems and that through these systems there are many benefits to the cyclist, it is pointed out that the physiological effects and benefits obtained through cycling can be characterized by: reduction of fat percentage, decreased levels levels Systolic pressure, better functioning of physiological systems, greater use of lipids as a source of energy, better redistribution of blood flow in tissues, stimulates hormone production that are responsible for a plethora of physiological interactions, strengthens the cardiorespiratory system and decreases cholesterol.

Compliance with ethical standards

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All authors developed the work, there is no conflict of interest.

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