

Importance of Sport for the Human Body

Sport is one of the most effective ways to keep the body healthy and active.

Physical activity helps improve blood circulation, strengthen muscles, and increase the body's overall energy.

People who regularly participate in sports have a lower risk of developing various diseases such as cardiovascular problems, diabetes, and obesity.

In addition, sport also has a positive effect on mental health by reducing stress and improving mood.

Different sports affect the body in different ways. Some sports develop physical strength more, while others improve endurance or flexibility. However, one sport that combines many benefits is swimming.

Participation in sports activities plays an important role in the development of young people by providing numerous physical, social, and psychological benefits. During adolescence, involvement in sports helps develop life skills, build relationships, and strengthen personal identity. The impact of sport on the overall development of young people is very important because it connects physical ability, social interaction, and psychological well-being into one developmental process.

In essence, participation in sports serves as a foundation for promoting a healthy lifestyle and physical well-being among young people. Through regular physical activity, adolescents improve cardiovascular health and muscular strength, while also developing motor skills and coordination.

In addition, the structured and disciplined nature of sport encourages habits such as perseverance, discipline, and goal setting, creating a strong foundation for lifelong health and well-being.



Swimming as One of the Most Complete Sports

Swimming is a physical activity performed in water that requires good coordination of body movements and breathing.

It is a very popular sport all around the world and is practiced both for recreation and at a professional level. Many people choose swimming as a form of relaxation and a healthy activity

for the body and mind because it combines physical exercise with a calming effect on the nervous system.

One of the reasons why swimming is considered a very beneficial sport is the fact that it activates almost all the muscles of the body.

During swimming, the muscles of the arms, legs, abdomen, and back work together, helping to tone and strengthen them. In addition, swimming improves endurance and flexibility, allowing the body to move more freely and in a coordinated way.

Water creates a natural resistance that helps strengthen muscles without placing great pressure on the joints, which makes this sport suitable even for elderly people or individuals with muscular problems.

Furthermore, swimming has a special effect on the cardiovascular and respiratory systems because it requires controlled breathing and continuous movement. This helps improve lung capacity, strengthen the heart, and increase physical endurance.

Another important benefit of swimming is its positive impact on the nervous system and mental health. Activities in water help reduce stress and anxiety, improve mood, and create a general feeling of relaxation. For this reason, swimming is often recommended as a complete sport.

Swimming Styles and Their Impact on the Body

There are several main swimming styles, each with different characteristics and effects on the body:

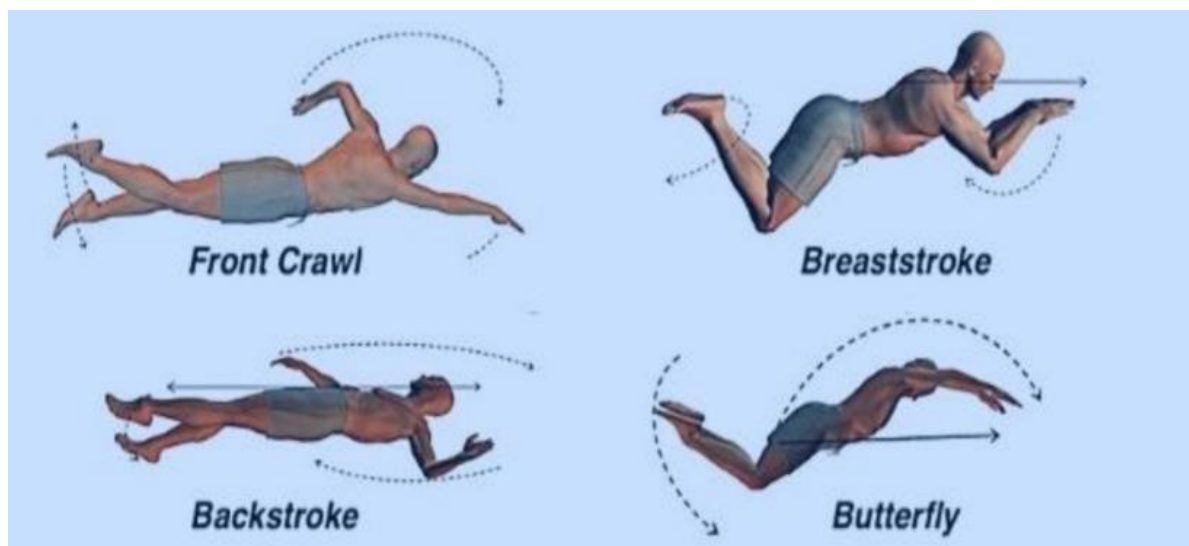
Freestyle – Activates the arm and leg muscles and improves overall endurance.

Backstroke – Helps relax the back and neck while improving body posture.

Breaststroke – Improves leg strength and coordination between the arms and legs.

Butterfly stroke – A difficult style that requires great strength and coordination; it helps develop the back and chest muscles.

Each style has a different impact on the muscular, cardiovascular, and respiratory systems, making all swimming styles beneficial for health.



The Impact of Swimming on the Muscular System

During swimming, the body's muscles are continuously activated to keep the body moving in the water. The repeated movements of the arms and legs, together with controlled breathing, cause many muscle groups to work simultaneously. This helps strengthen, develop, and tone the body's muscles.

The muscles of the arms and shoulders play a very important role during swimming. These include muscles such as the deltoids, biceps, and triceps, which help push the water and move the body forward.

In addition, the back muscles, such as the latissimus dorsi and trapezius, are also very important. These muscles help stabilize the body and coordinate arm movements. Strengthening them helps improve body posture and protect the spine.

The abdominal muscles, such as the rectus abdominis and the oblique muscles, play an important role in maintaining balance and body stability during swimming. They help keep the body in the correct position and coordinate movements between the upper and lower parts of the body.

The leg muscles are also highly active during swimming. These include the quadriceps, hamstrings, and calf muscles (gastrocnemius). These muscles help move the body through the water and maintain speed while swimming.

Main effects on muscles:

Muscle toning and development: Swimming helps develop muscle mass throughout the body by creating resistance in every direction. Although it is not as focused on muscle growth as weightlifting, it leads to visible muscle definition.

Full-body engagement:

Upper body: Activates the shoulders (deltoids), chest (pectoral muscles), and back (latissimus dorsi) for strength and endurance.

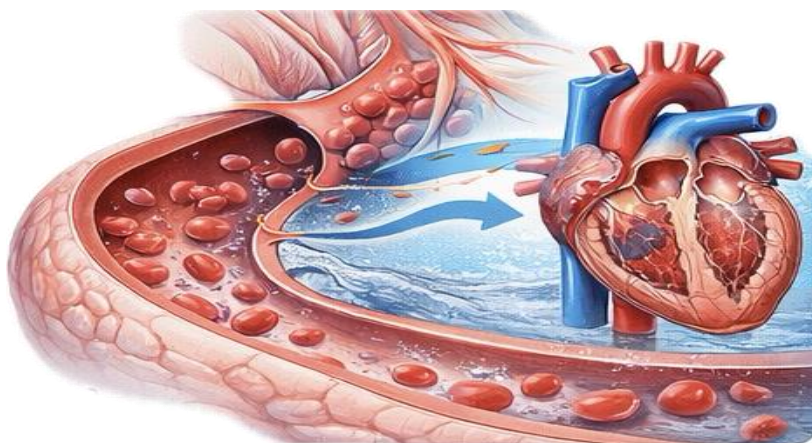
Core: Continuously activates the abdominal and lower back muscles for stabilization.

Lower body: Strengthens the glutes, quadriceps, hamstrings, and calf muscles through continuous movement.

Muscular endurance: Continuous movements during swimming increase the muscles' ability to work for longer periods without fatigue.

Improved flexibility: The wide range of movements used in swimming helps increase the flexibility of muscles and joints.

The Impact of Swimming on the Cardiovascular System



Swimming is an aerobic activity that requires continuous physical effort, activating the heart and lungs in a coordinated way. (Fig. 4)

During swimming, the heart pumps blood faster and more efficiently in order to supply the muscles with oxygen and nutrients. This activity also helps regulate blood pressure and maintain a normal heart rhythm.

With time and regular practice, the heart becomes stronger and more efficient. It is able to pump more blood with each beat, reducing stress on the cardiovascular system.

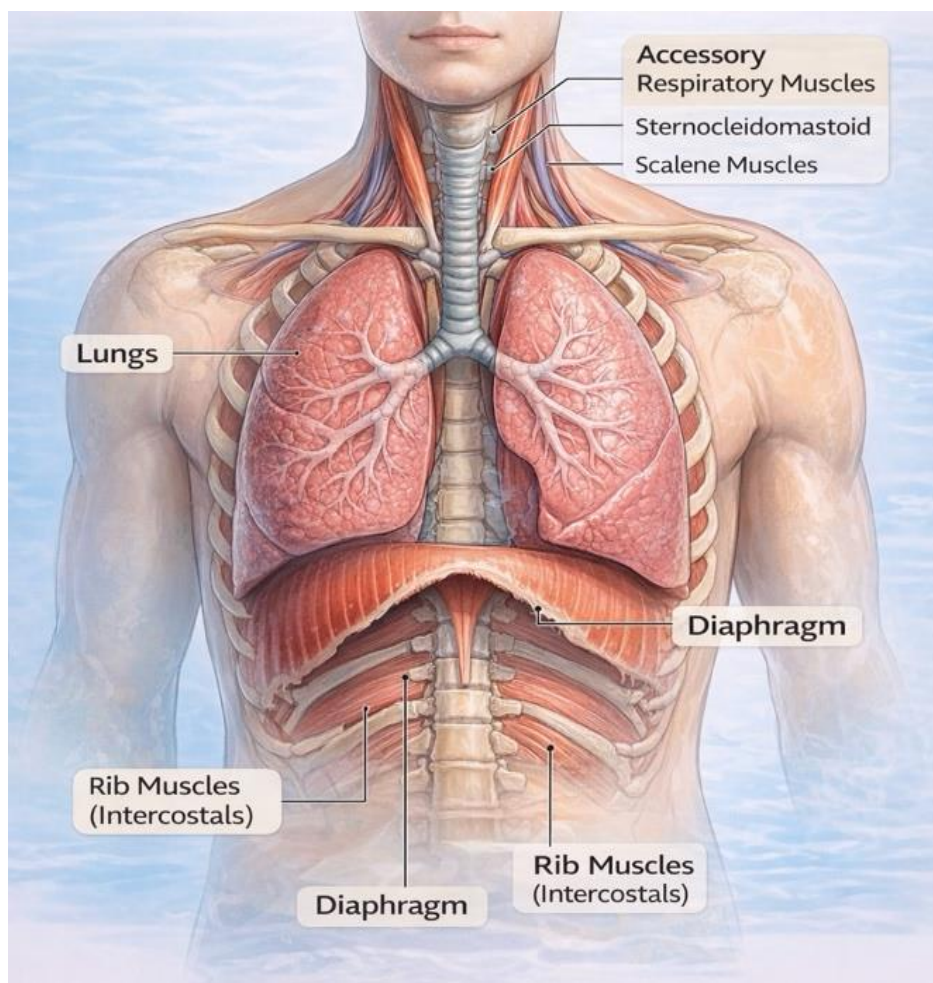
This lowers the risk of heart diseases such as hypertension, atherosclerosis, or heart attack. Swimming also helps improve the elasticity of blood vessels, enhancing circulation and reducing the risk of blood clots.

People who swim regularly usually have a stronger and more resilient heart, which allows them to perform physical activities for longer periods without getting tired quickly. Furthermore, swimming also helps in the treatment and prevention of circulation problems, improving overall cardiovascular health. (Fig. 5)



The Impact of Swimming on the Respiratory System

During swimming, the lungs and diaphragm are the main structures that are activated. Swimming requires controlled breathing, the swimmer must hold their breath while submerged and inhale when the head comes above the water. This increases the vital capacity of the lungs, which is the maximum amount of air the lungs can inhale and exhale in a full breath. (Fig. 6)



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The diaphragm, the main breathing muscle, works more intensively during swimming. Its stronger movement helps expand the chest and allows more air to enter the lungs. In addition to the diaphragm, the intercostal muscles (the muscles between the ribs) are also activated to assist in expanding and contracting the thoracic cavity. Swimming also helps strengthen the airways and bronchi, improving airflow and oxygenation of the blood. People who practice swimming regularly usually develop deeper, more coordinated, and more stable breathing, which also helps improve physical endurance during other activities.

Swimming and Disease Prevention

Swimming is one of the most beneficial sports for disease prevention. It activates almost all the muscles and improves the functioning of the cardiovascular and respiratory systems.

Obesity: Water exercises help burn calories and improve metabolism. Swimming 2–3 times a week helps maintain body weight.

Heart and blood circulation: Swimming strengthens the heart and improves blood circulation, reducing the risk of cardiovascular diseases and hypertension.

Bones and back: Water exercises do not create pressure on the joints, help strengthen bones, and improve body posture, reducing back pain.

For good results, regular swimming is recommended, combined with a healthy lifestyle and other physical activities.

Psychological Benefits of Swimming and Sport

In general, sport also has a positive impact on mental health. Physical activity helps release hormones that improve mood and reduce stress.

Swimming is a very relaxing activity because water helps calm both the body and the mind. Many people feel more relaxed and peaceful after a swimming session. In addition, sport helps increase self-confidence and improves concentration.

Swimming and Age Groups



Children: Development of coordination, flexibility, muscle strength, and self-confidence.

Young people and adults: Increases strength, endurance, and aerobic capacity; maintains flexibility and a healthy body weight.

Elderly people: Improves mobility, balance, and overall health; reduces joint pain and improves blood circulation.

Conclusion

In conclusion, sport plays a very important role in maintaining both physical and mental health. Physical activity helps improve the functioning of many body systems, such as the muscular, skeletal, cardiovascular, and respiratory systems. Through sport, the body becomes stronger, more resilient, and healthier. Among different sports, swimming is considered one of the most complete and beneficial activities for the human body.

Swimming activates almost all the muscles, improves breathing, and helps strengthen the heart and lungs. In addition to physical benefits, swimming also has a positive impact on mental health by reducing stress and improving psychological well-being.

Regular participation in sports, especially swimming, is very important for people of all ages. It helps maintain a healthy lifestyle and improves the quality of life. For this reason, sport and physical activity should be encouraged as an essential part of everyday life for every individual.

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IMPACT OF WASTEWATER IRRIGATION ON HEAVY METAL CONCENTRATIONS IN VEGETABLES, WITH PRIMARY FOCUS ON Pb AND Cd

Katerina TEMELKOVSKA RISTEVSKA¹, Tatjana BLAZHEVSKA¹, Gorica PAVLOVSKA¹, Vezirka JANKULOSKA¹, Valentina VELKOVSKI¹, Nevena GRUEVSKA¹, Kristina JANKULOSKA GACOSKA¹

¹ Faculty of Technology and Technical Sciences - Veles, University St. Kliment Ohridski - Bitola, Dimitar Vlahov 57, 1400 Veles, Republic of North Macedonia

*Corresponding author e-mail: katerina.temelkovska@uklo.edu.mk

Abstract

This review paper evaluated the impact of wastewater irrigation on heavy metal accumulation in vegetables, focusing specifically on lead (Pb) and cadmium (Cd). Rising water exploitation poses a severe risk to the environment. Heavy metal contamination, primarily driven by industrial activities such as textile manufacturing, mining, and metal processing, remains a major global concern. The application of wastewater for irrigation can significantly elevate heavy metal concentrations in both soil and crops. In many regions worldwide, vegetables that constitute a vital part of the human diet are being irrigated with untreated wastewater. Findings indicated that leafy greens, such as spinach and lettuce, along with root vegetables, exhibited high bioconcentration and transfer factors (TF > 1). Furthermore, Pb and Cd levels in wastewater-irrigated vegetables frequently exceed the Maximum Levels (MLs) set by the Codex Alimentarius 2023. This study also assessed modern treatment technologies, concluding that membrane filtration and ion exchange methods are essential for mitigating these risks. Ultimately, it was established that rigorous monitoring and efficient purification processes are critical for ensuring food safety and environmental protection.

Keywords: Wastewater irrigation, Lead (Pb), Cadmium (Cd), Bioaccumulation, Vegetables

Introduction

Water is a precious natural resource upon which the sustainability of agriculture, an adequate food supply, and a productive environment for all living organisms rely. Unfortunately, water is exposed to maximum exploitation and heavy metal accumulation, which is not only an ecological issue but also a global problem (Kausar *et al.*, 2017; Dadebo *et al.*, 2024; Kilic, 2020). Irrigation water can be defined as water used for the production of cultivated plants. Irrigation is the delivery of water to plant roots when the required amount of water cannot be met by precipitation (Ors *et al.*, 2021; Shahriar *et al.*, 2023). The increase in the content of toxic metals and metalloids in irrigation water is a matter of worldwide concern, as toxic metals enter the soil and, through the root system, accumulate in the edible parts of plants such as vegetables (Kausar *et al.*, 2017). The use of wastewater for irrigation, especially if it has a high concentration of heavy metals and during long-term application, can significantly increase the concentration of heavy metals in the soil and, consequently, in the plants (Aboukila, 2022; Mushtaq *et al.*, 2010).

Wastewater is any water that has been contaminated by human use in domestic, industrial, commercial, and agricultural activities, as well as untreated sewage water, and it is most commonly used in agriculture (Sane *et al.*, 2020; Khalid *et al.*, 2018). Many studies are focused on analyzing heavy metal concentrations in vegetables and plants irrigated with various types of wastewater, such as industrial wastewater (Singh *et al.*, 2024), sewage (Bao *et al.*, 2014), drainage, agricultural and domestic waste (Nowwar *et al.*, 2023), farms, wells, streams, and rivers (Lere *et al.*, 2021), domestic wastewater (Ahmad *et al.*, 2015), and others. High concentrations of heavy metals such as cadmium, lead, chromium, copper, nickel, zinc, and iron have been found in wastewater from various industries, including textiles, construction, and mechanical manufacturing, exceeding the maximum permissible concentrations for