

Effect of Exercise and Obesity on Human Physiology

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DOI: [10.36348/sb.2022.v08i01.003](https://doi.org/10.36348/sb.2022.v08i01.003)

| Received: 15.12.2021 | Accepted: 19.01.2022 | Published: 24.01.2022

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Abstract

Physical activity and exercise on a regular basis can help you stay healthy, energetic, and independent as you age. Exercise is essential in preventing health problems such as heart disease and stroke. Many studies have demonstrated the health benefits of regular exercise. This report examines the evidence regarding the health benefits of exercise across the board. Physical activity and exercise can help to lower stress and anxiety, enhance happy neurotransmitters, promote self-confidence, boost brain function, improve memory, and strengthen our muscles and bones. It also aids in the prevention and treatment of heart disease, obesity, blood sugar swings, cardiovascular disease, and cancer. It also aids in the prevention and treatment of heart disease, obesity, blood sugar swings, cardiovascular disease, and cancer. Regular physical activity has been shown the useful in the primary and secondary prevention of a variety of chronic diseases (e.g., cardiovascular disease, diabetes, cancer, hypertension, obesity, depression, and osteoporosis) as well as premature death.

Keywords: Obesity, exercise, blood sugar, body fat.

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INTRODUCTION

Physical activity is defined as any bodily movement that requires energy expenditure and is performed by skeletal muscles. "Physical activity" is not the same as "exercise." Exercise is a type of structured, repetitive, and intentional physical activity [1]. A healthy body equals a healthy mind." It means that if a person is weak, dull, or sick, he will be unable to complete his work effectively and efficiently."All parts of the body, if used in moderation and exercised in labours to which each is accustomed, become thereby healthy and well developed and age slowly," Hippocrates wrote in the 5th century BC, "but if they are unused and left idle, they become liable to disease, defective in growth, and age quickly"[2].

However, by the twenty-first century, belief in the value of exercise for health had waned to the point where a lack of exercise has become a major public health issue [2]. Similarly, a lack of exercise has been identified as a cause of chronic disease and death [3]. Exercise helps to decrease blood pressure and enhance circulation. Exercise aids in the loss of excess body weight, lowering blood pressure.

Calories are burned as a result of exercise. Exercise, when combined with good nutrition, is the most effective approach to avoid obesity. If a healthy individual does not exercise on a regular basis, he may become physically unfit. If we do not engage in regular physical activity, our muscles' efficiency decreases. As a result, we must engage in daily physical activity. Exercise has been linked to a variety of physical and physiological benefits that can help a person work more effectively and feel better. The articles given here are just a small sample of the over 100,000 studies that suggest a link between "exercise" and "health"[6].

Exercise

Exercise is a type of physical exercise that is organized, regulated, and repeated with the goal of conditioning a certain body area. Exercise is beneficial for improving health and fitness, as well as for physical rehabilitation. Exercise may also be defined as any bodily action that is done to improve or maintain physical fitness and general health. There are four types of exercise and physical activity. 1) Endurance, 2) strength, 3) Balance, 4) Flexibility [38].

Endurance	It raises your heart rate and breathing rate. They increase your overall fitness while keeping your heart, lungs, and circulatory system healthy. Increasing your endurance makes it easier to complete many of your daily tasks. This kind includes activities such as walking or running, mowing, raking, digging, and dancing.
Strength	Muscles become stronger as a result of exercise. Even minor gains in strength can have a significant impact on your ability. Lifting weights and utilizing a resistance band with your own body weight are examples of this form of workout
Balance	Exercises can help prevent falls, which are a common problem among the elderly. Many lower-body strength workouts will also help you gain balance. Many lower-body strength workouts will also help you gain balance
Flexibility	Exercises assist your body stay limber by stretching your muscles. Being flexible allows you to move more freely during other exercises and in everyday activities. Shoulder and upper arm stretch, calf stretches, and yoga are some examples.

Effect on the human body

Physical exercises can be divided into two categories: aerobic and non-aerobic [4]. Aerobic exercise: It is any physical activity that requires the usage of big muscle groups and causes the body to consume more oxygen than when it is at rest. Aerobic exercise is intended to improve cardiovascular endurance [5, 39]. Cycling, swimming, brisk walking, skipping rope, rowing, hiking, tennis, continuous training, and long slow distance training are all examples of aerobic exercise. Anaerobic exercise: Strength and resistance training, which involves muscle firming, strengthening, and toning, as well as bone strength, balance, and coordination, can help to firm, strengthen, and tone muscles [6]. Push-ups, lunges, and dumbbell bicep curls are examples of strength exercises. Weight training, functional training, eccentric training, interval training, sprinting, and high-intensity interval training are all examples of anaerobic exercise that build short-term muscle strength [7].

Exercise Is Crucial

Muscles, blood, bones, and other living tissue make up each of our physical bodies. We become ill when any of these become harmed or stop performing properly. As a result, it is critical that we maintain a healthy and fit body. If we don't exercise, our muscles weaken and we become more stressed [18]. Getting enough sleep can help improve overall wellness and reduce stress. In terms of anxiety, the warm and hormones created during and after any physical activity can assist those who suffer from anxiety problems relax [8]. Getting some moderate-to-intense cardio on the track or treadmill Aerobic exercise of moderate to high intensity has been shown to lower anxiety sensitivity in certain people [9].

Advantages

Impact on the lungs

Regular exercise strengthens the heart and lungs, allowing the cardiovascular system to provide more oxygen to the body with each beating and the pulmonary system to enhance the maximum quantity of oxygen the lungs can absorb [10].

The impact on body fat

Exercise lowers blood pressure, lowers total and low-density lipoprotein (LDL) cholesterol (bad cholesterol) levels, and raises high-density lipoprotein (HDL) cholesterol levels (the good cholesterol). Heart attacks, strokes, and coronary artery disease are all reduced as a result of these beneficial impacts [11].

Muscle and Joint Effects

Exercise strengthens muscles, allowing people to perform tasks they might not be able to do otherwise or to do them more easily. Muscle strength and joint range of motion are required for every physical task. Both of these abilities can be improved with regular exercise [12]. Exercise stretches muscles and joints, increasing flexibility and reducing the risk of injury. Exercise can also assist to improve balance by strengthening the tissues around joints and throughout the body, reducing the risk of falling. Weight-bearing activity like brisk walking and weight training helps to strengthen bones and prevent osteoporosis [28].

Muscular-strengthening exercises can aid in the growth or maintenance of muscle mass and strength. By keeping joints in appropriate alignment, strong muscles and ligaments lessen the likelihood of joint and lower back pain. Additionally, changes to the circulatory and respiratory systems can promote greater oxygen and glucose delivery to the muscle during exercise [27]. People who engage in 120 to 300 minutes of moderate-intensity aerobic activity each week have a decreased risk of hip fracture [28], according to research.

Effect on the levels of neurotransmitters and hormones

Nor-epinephrine, a hormone that helps decrease the brain's response to stress, is also increased by exercise. Stress levels are considerably reduced when you are exercising. Physical activity that is both aerobic and anaerobic is beneficial to one's overall health. According to a study, 30 minutes of exercise five or more days a week helps to reduce despair and mental stress [10]. When it comes to anxiety, the warmth and hormones released during and after

physical activity can help persons with anxiety disorders relax [8].

Exercise releases endorphins, which are happy and euphoric chemicals. Exercise has been demonstrated in studies to improve symptoms in clinically depressed people [11]. As a result, doctors advise that patients who are depressed or anxious do so. Exercise can be just as beneficial as antidepressant medications in treating depression in some situations.

The impact on the brain cells

Cardiovascular exercise has been proven in tests on mice and men to develop new brain cells (known as neurogenesis) and increase overall brain performance [12]. A rigorous workout has been shown to raise levels of a brain-derived protein (BDNF) in the body, which is thought to aid decision-making, higher thinking, and learning [8].

Physical activity improves memory and the ability to learn new things when done on a regular basis. Sweating stimulates the formation of memory and learning-related cells in the hippocampus [13]. As a result, studies have linked children's brain development to their level of physical fitness. However, exercise-based brainpower isn't just for kids; regular exercise can also help adults improve their memory. Running sprints increased language memory in healthy people, according to a research [14].

The impact on the heart

The heart is a muscle that requires regular exercise to stay in good form. Exercise helps to strengthen the heart muscles on a daily basis. When the heart is exercised, it can pump more blood through the body and continue to perform at peak efficiency with less effort. Regular exercise also helps to maintain the flexibility of arteries and other blood vessels, ensuring proper blood flow and blood pressure. Physical activity on a daily basis lowers the risk of heart disease [15].

Effect on body mass index

Excess calories are stored as fat in the body and an individual who consumes too many calories over time can become obese. Exercising can help you avoid gaining weight or keep it off once you've lost it. The higher the intensity of your physical activity, the more calories you will burn. Regular exercise (together with good nutrition) can help you lose weight. We will lose the most weight if we follow a cardiovascular exercise programme of moderate intensity activity for 5-7 days a week [16].

Blood sugar levels are affected

When it comes to diabetes management, exercise and diabetes go hand in hand. In T2D patients, a single bout of exercise increases glucose absorption by skeletal muscle, bypassing the insulin receptor and consequently insulin resistance [17, 20]. Insulin triggers a sequence of modifications after attaching to its receptor, eventually boosting GLUT4 translocation to the plasma membrane [21, 22]. Insulin fails to promote GLUT4 translocation in T2D patients despite normal GLUT4 levels [23]. Exercise, on the other hand, aids GLUT4 expression translocation to the plasma membrane without requiring the insulin receptor. As a result, lower blood sugar levels. The impact of physical activity on blood glucose levels varies depending on how long you exercise and a variety of other factors. By making your body more responsive to insulin, physical activity can drop your blood glucose for up to 24 hours or more after your workout [24].

Effect on cancerous cell

Several basic studies have emerged on the relationship between cancer and brain activity [25]. The available literature indicates that this is due to a reduction in the incidence of certain cancers, especially colon and breast cancer, as a normal physical activity, as a poll or as a recreational activity [27]. Exercise can play a key role in further reducing the risk of many cancers. It has been estimated that 30 to 60 minutes of moderate psychological activity is required for areas with colon cancer, endometrial cancer and lung cancer. [28] Most studies show that more than 30 minutes of moderate-intensity activity is less likely than breast cancer, according to a new study [29].

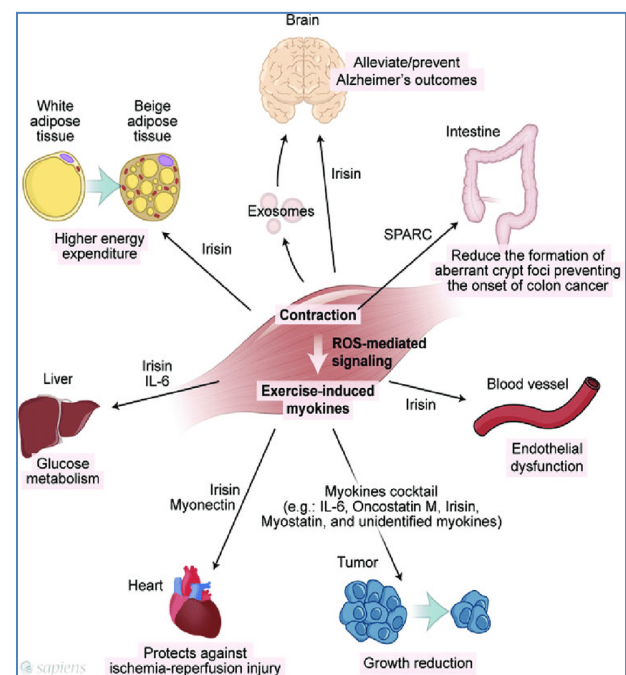


Fig-01: Tissue-specific metabolic effects of exercise [44]

List of Physiological Disorder because of lack of exercise: [29]

- | | |
|--|--------------------------------------|
| 1. Accelerated biological aging | 21. Hemostasis |
| 2. Premature death | 22. Hypertension |
| 3. Aerobic (cardiorespiratory) fitness | 23. Immunity |
| 4. Arterial dyslipidemia | 24. Insulin resistance |
| 5. Balance | 25. Metabolic syndrome |
| 6. Bone fracture | 26. Nonalcoholic fatty liver disease |
| 7. Breast cancer | 27. Obesity |
| 8. Cognitive dysfunction | 28. Osteoarthritis |
| 9. Colon cancer | 29. Osteoporosis |
| 10. Congestive heart failure | 30. Ovarian cancer |
| 11. Constipation | 31. Pain |
| 12. Coronary (ischemic) heart disease | 32. Peripheral artery disease |
| 13. Deep vein thrombosis | 33. Preeclampsia |
| 14. Depression and anxiety | 34. Polycystic ovary syndrome |
| 15. Diverticulitis | 35. Pre diabetes |
| 16. Endometrial cancer | 36. Rheumatoid arthritis |
| 17. Endothelial dysfunction | 37. Sarcopenia |
| 18. Erectile dysfunction | 38. Stroke |
| 19. Gallbladder diseases | 39. Tendons being less stiff |
| 20. Gestational diabetes | 40. Type 2 diabetes |

Obesity

It has been observed obesity is increasing day by day 30 years obesity is increasing a lot. However the more developed country is more there will be obesity life has become urbanize and modernize. It has been estimated that 300 million around the world have been exceeding from the BMI ratio. According to recent study USA population it has been expected that obesity will continue to increase by day. In Australia increasing is about 19% to 22% and females [43].

It is hard to know which factor is specifically responsible for obesity but, it is usually the food supply, eating behaviors, the new family work culture, lifestyle social and economical status more Urban Design live

and public policies driving role in obesity [42]. It has been also observed that our genetics our genome from our parents could be also factor in obesity, the lifestyle, metabolic interaction in the body could also determining factor of obesity. A lot of factor has been changed from last 30 years; it is like a pandemic that everyone should have knowledge about, so that important preventive measure can be taken [42].

There is a lot of risk in obesity in health-wise disease, type 2 diabetes and hypertension disease that can be happen from obesity. So, those once have to take great care of psychological, emotional, nutritional and metabolic problems.

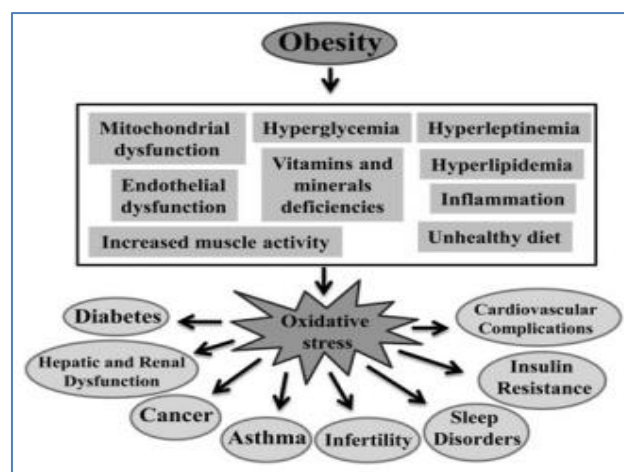


Fig-02: Obesity, oxidative stress, disinfection, associated tissue and health [43]

Effects of obesity on body

Being overweight and obese are linked with great amount of risk for hypertension, diabetes abnormal cholesterol, coronary heart disease, stroke, disease related to gallbladder, sleep apnea, problem related to respiration and even cancer [31]. Obesity has severe health problems all around the world in all ages males and females, genetics is also responsible for obesity in person and it can be very from person to person, how to know if someone get obese the formula is simple it's taking high amount of calories than required in the body, and repeating this for days will get person obese.

Effect of Obesity on heart

Obesity also affects heart function, which increases the risk of heart failure. Increased cardiac output related to obesity, high blood pressure, metabolic regulation stress and, decreased fertility, included in epicardial fat, and myocardial fat infiltration are all obese-related cardiac eccentric and concentrated hypertrophies [36]. Participate in a special farm. Framingham data show that I-obesity is twice as likely to be present in class III with cardiac [37].

Obesity on blood pressure

Increase level of circulating adhesion molecules, on the endothelial surface. E-selectin, p-selectin and intracellular adhesion molecule-1. Endothelial contraindication is impaired with obesity, especially visceral obesity. Obesity is caused by arterial high blood pressure [32].

Obesity induced oxidative stress

Oxidative stress due to obesity leads to the development of various pathological events, including insulin resistance and diabetes, heart complications; sleep disorders, asthma, oncological problems, reproduction, arthritis problems, and liver failure. Growing evidence suggests that oxidative stress plays a key role in linking obesity to its associated complications. Obesity can cause systemic oxidative stress through various biochemical mechanisms Such as NADPH oxidase to superoxide generation, oxidative phosphorylation, glyceraldehyde auto oxidation, protein kinase activation, and polyol and hexosamine pathways. Other factors that contribute to oxidative stress in obesity include hyperlipidemia, low antioxidant defenses, chronic inflammation, and post-pyramidal reactive oxygen species [31].

Obesity induce inflammation

Brown and white adipose tissues are two types of adipose tissue. White form of adipose tissue no longer taken as inert tissue, these tissues are considered as energy storage. It is promising as significant participant of pathological and physiological processes, inflammation and immunity included. Anti-inflammatory plus pro-inflammatory factors like leptin, adipokines, resistin, chemokines, MCP-1, cytokines, IL-6, TNF- α , and adiponectin production depend on adipose tissue [40].

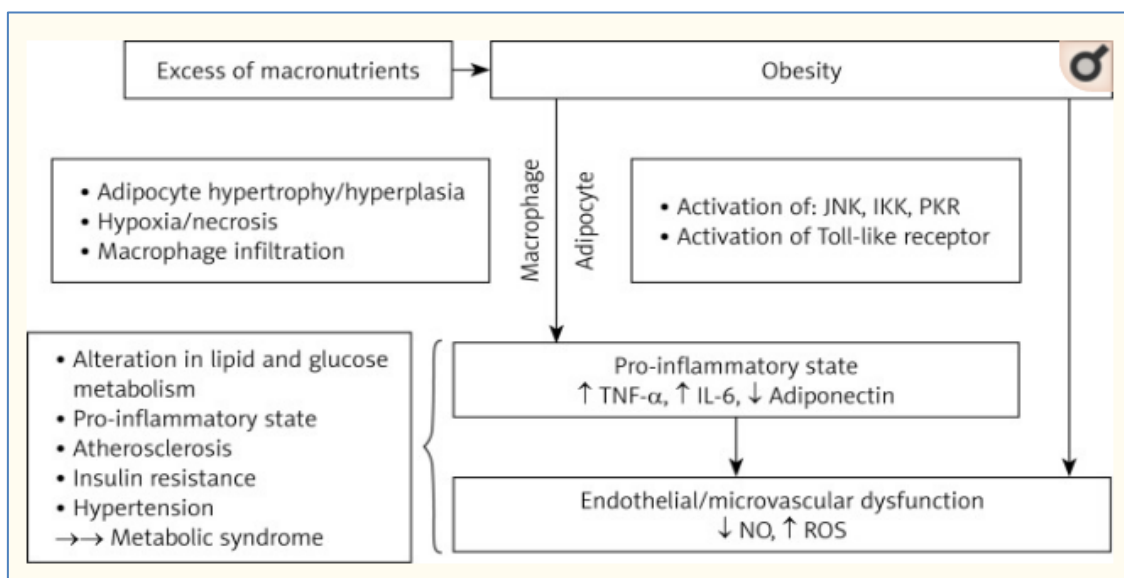


Fig-03: Excess of micronutrients and obesity reduce inflammation [40]

C-reactive protein synthesis from liver is stimulated by elevated level of interleukin-6. A reduced level of adiponectin, a significant predictor of cardiovascular mortality, is associated with impaired fasting glucose, leading to type-2 diabetes development,

metabolic abnormalities, coronary artery calcification, and stroke [33].

Decrease in adiponectin leads to cardiovascular mortality, type-2 diabetes development

and stress reduces with daily exercise. It also improves confidence level, increase mood lifting neurotransmitter, increase bone and muscle strength, sharpen memory, better brain power. Exercise gives both long term and immediate health benefits. Most importantly life quality improves with exercise. 30 min exercise per days increase chances of good and quality life.

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