Aerobic Exercise and Cardiovascular Health: A Literature Review on its Impact on Heart Rate, Blood Pressure, and Weight

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ABSTRACT

This literature review explores the impact of aerobic exercise on cardiovascular health, specifically examining its effects on heart rate, blood pressure, and weight management. Drawing from peer-reviewed studies, clinical trials, and meta-analyses published between 2000 and 2020, the review synthesizes evidence on how regular aerobic activities—such as walking, running, and swimming—contribute to cardiovascular fitness. The findings indicate that aerobic exercise significantly lowers resting heart rate, improves heart function, reduces systolic and diastolic blood pressure, and aids in weight regulation, particularly among individuals with hypertension or elevated cardiovascular risk. In contrast, sedentary lifestyles and insufficient physical activity are associated with higher heart rates, elevated blood pressure, and increased risk of obesity. The review highlights the importance of consistent aerobic activity as both a preventive and therapeutic strategy for maintaining cardiovascular health. It also identifies areas for future research, including the long-term effects of exercise, optimal training parameters for different populations, and behavioral factors influencing adherence. The study recommends the promotion of regular aerobic exercise in both clinical and public health settings to enhance cardiovascular outcomes.

Keywords: aerobic exercise, cardiovascular health, heart rate, blood pressure, weight management

INTRODUCTION

Aerobic exercise has long been recognized for its numerous health benefits, particularly in enhancing cardiovascular health. It plays a critical role in improving physiological functions such as heart rate, blood pressure, and body weight regulation. Cardiovascular fitness—the capacity of the heart and lungs to supply oxygen to the muscles during prolonged physical activity—is essential for maintaining overall health and reducing the risk of chronic diseases (Padilla, 2010; Battaglia, 2013). Regular participation in aerobic activities such as walking, running, and swimming strengthens the heart, reduces resting heart rate, and increases the efficiency of the circulatory system (Schwartz, 2014). A conditioned heart, resulting from consistent aerobic exercise, pumps blood more effectively, which contributes to a lower resting heart rate and enhanced cardiovascular endurance.

Beyond heart rate improvement, aerobic exercise also exerts a positive impact on blood pressure regulation. Studies have shown that regular aerobic activity can significantly reduce both systolic and diastolic blood pressure, especially among individuals diagnosed with hypertension (Dimeo, 2012; Florida, 2018). This reduction is crucial in managing cardiovascular risk factors and preventing heart-related complications (Southard, 2010). In addition, aerobic exercise is an effective strategy for managing body weight—a key factor in mitigating the risk of obesity-related conditions such as diabetes and cardiovascular disease (Jakicic, 2012; Swift, 2013).

The significance of conducting this literature review lies in the need to synthesize a wide range of findings on how aerobic exercise influences cardiovascular health indicators. While the benefits of aerobic exercise are well-documented, this review consolidates evidence from various studies to offer a comprehensive understanding of its physiological effects, especially on heart rate, blood pressure, and weight. By examining

literature spanning two decades, this review provides updated insights that may support health professionals, educators, and policymakers in promoting aerobic activity as a preventive and therapeutic intervention. Moreover, it identifies consistent patterns across different populations, supporting the incorporation of aerobic exercise into lifestyle recommendations for both healthy individuals and those with existing cardiovascular conditions (Southard, 2010; Pagonas, 2013).

This literature review therefore aims to provide an evidence-based synthesis of how aerobic exercise contributes to cardiovascular health, focusing specifically on its effects on heart rate, blood pressure, and weight management. The findings will contribute to a broader understanding of the role of physical activity in health promotion and disease prevention.

MATERIALS & METHODS

This literature review employed a systematic approach to gather and synthesize existing research on the effects of aerobic exercise on cardiovascular health, with a specific focus on heart rate, blood pressure, and weight management. A comprehensive search was conducted using academic databases such as Google Scholar, PubMed, and ScienceDirect, targeting studies published between 2000 and 2020. Keywords used in the search included “aerobic exercise,” “cardiovascular health,” “heart rate,” “blood pressure,” and “weight management.”

The inclusion criteria were as follows: (1) peer-reviewed journal articles, clinical trials, or meta-analyses published in English; (2) studies involving adult participants aged 18 years and above; and (3) research that explicitly examined the effects of aerobic exercise on at least one of the following cardiovascular parameters—heart rate, blood pressure, or weight. Both studies on healthy individuals and those with hypertension or cardiovascular conditions were considered.

Exclusion criteria included: (1) articles published prior to 2000; (2) studies that did not specifically focus on aerobic exercise or cardiovascular outcomes; and (3) publications lacking quantitative measurements related to cardiovascular health.

Selected studies were critically appraised for methodological rigor, relevance, and consistency of findings. Key variables extracted from the studies included participant characteristics, type and duration of aerobic exercise interventions, and outcomes related to resting heart rate, blood pressure levels, and weight changes. The synthesized data provided a comprehensive overview of the physiological effects of aerobic exercise and informed the thematic organization of the results and discussion section.

RESULT AND DISCUSSION

Effects of Aerobic Exercise on Heart Rate

Monitoring pulse rate is the most commonly used technique for measuring aerobic fitness and estimating the percentage of maximum aerobic capacity. A lower resting heart rate indicates that the heart is working efficiently and has a good aerobic condition. Children have a range from 70 to 100 (bpm), adults have 60 to 100 (bpm), and a well-trained athlete has 40 to 60 beats per minute (Padilla, 2010).

Also, the average Resting Heart Rate (RHR) Resting Pulse Rate (RPR) is 75 beats for boys and 80 beats for girls per minute. An ordinary college freshman should approximately have an Exercising Heart Rate (EHR) of 130-160 (bpm). This is gradually attained in the workout phase and sustained by steady exercise for about 15-minutes. In Recovery Heart Rate (RHR)/ Recovery Pulse Rate (RPR), The heartbeat should go back to normal or slightly above the resting rate (Gewitz, 2011).

One of the ever-recorded lowest resting pulse rate is Danniel Green, a healthy human, 81-years old, an Internationally known Chef, Host, International Television Personality, and Award-Winning Author also known as The Model Cook has recorded what could be the world's lowest ever heart rate with 26 beats per minute (bpm) (Alexander, 2014).

Cardiovascular fitness is best improved by activities, which employ large muscle groups working dynamically. Such activities include walking, jogging, running, swimming, skating, cycling, stair climbing, and cross-country skiing. The heart is like any other muscle - it becomes stronger and more efficient after practice. Pulse rate is a quantitative measure of the heart's work. At rest, a healthy heart of an average individual beats approximately 70 (bpm). A conditioned heart beats much less at rest, only 40 to 50 (bpm) or even less. Heart rate variability is a quality measure of the heart's work. The lower resting heart rate has the higher variability, and thus the better the quality of the heart's functions. Cardiovascular fitness is health-related to age, gender, exercise habits, heredity, and cardiovascular clinical status. Maximum values occur between ages 15 and 30 years, decreasing progressively with age. At 60 years old, the mean maximal aerobic power in men is approximately three-fourths of that age of 20. With a sedentary lifestyle, there is a 10 % reduction in the mean maximal aerobic power per decade, the reduction with an active lifestyle being less than 5 % (Battaglia, 2013)

Cardiovascular Fitness is a health-related component of physical fitness related to blood circulation and respiratory endurance to supply oxygen during sustained physical activity. Cardiovascular fitness is also referred to as cardiovascular endurance, aerobic fitness, and cardiorespiratory fitness. A VO2 max test in the laboratory setting is considered to be the best measure of cardiovascular fitness. Commonly administered field tests include the One-mile run/walk, the 12-minute run, the PACER run for children, and various bicycle, step, and treadmill tests (Uminho, 2013).

Increasing the heart rate through exercise makes the heart more accustomed to performing well when much blood is pumped into the heart. Improved performance increases the amount of blood pumped by the heart during one heartbeat. These changes decrease the heart rate and improve how the recovery pulse rate after exercise. People who exercise regularly have faster pulse rate recovery times than people who do not have regular exercises. (Schwartz, 2014)

As an aerobic human being, cardiovascular endurance level can be achieved through regular aerobic fitness activity. A healthy individual who demonstrates a lower heartbeat at rest generally implies more efficient heart function and better cardiovascular fitness.

Aerobic walking is biologically plausible; like other forms of regular moderate exercise, walking improves cardiac risk factors. Regular physical exercise reduces blood pressure and is broadly recommended by current American and European hypertension guidelines. Hypertensives are encouraged to engage in aerobic exercise regularly, such as walking, jogging, or swimming for 30–45 min daily (Pagonas, 2013). Aerobic exercise reduces blood pressure in both hypertensive and normotensive persons. An increase in aerobic physical activity should be considered an important component of lifestyle modification for the prevention and high blood treatment (Welton, 2002) cited by (Abu, 2018).

Effects of Aerobic Exercise on Blood Pressure

High blood pressure is sometimes called as the silent killer because it often has no symptoms. Even though this condition is asymptomatic, it is still important for you to get checked regularly, it is normal for your BP to fluctuate throughout the day. Excitement, being active, sleeping, and waking up are all situations where blood pressure changes naturally. When your activity ends, your BP reading should return to a normal range.

A normal blood pressure is usually defined as a systolic pressure below 120 mmHg, it is the measurement of blood from your heartbeats. The other one is diastolic pressure below 80mmHg; the heart is at rest between beats. (Florida M.C, 2018). Regular exercise is great for your overall well-being, and it can also help with lowering your blood pressure. Regular exercise keeps your heart strong and healthy.

Regular physical exercise is broadly recommended because it leads to a reduction of blood pressure in resistant hypertension. Hypertensives are encouraged to engage in aerobic exercise for 30 minutes daily. In normotensive, regular exercise reduces systolic by 3 to 5 mm Hg and diastolic blood pressure by 2 to 3 mm Hg (Dimeo, 2012)

Also, effectiveness in lowering blood pressure is a single session of aerobic exercise. To monitor the blood pressure, one must engage in usual aerobic activity either in-home or at work within 30 minutes duration of exercises. It must be maintained in a normal schedule of activities over 5 days (Southard, 2010). A single session of aerobic exercise might lower the blood pressure for up to 4 hours post-exercise as the subject engaged in his usual activities in-home and work.

Effects of Aerobic Exercise on Weight Management

Watching your weight and maintaining a healthy weight for your body will reduce the amount of stress on your heart and help regulate blood pressure. Excess body weight has been associated with an increase in health-related diseases such as heart disease, diabetes, certain forms of cancer, musculoskeletal disorders, and other related problems (Jakicic, 2012.) Aerobic exercise is one of the preventions of weight gain, initial weight loss, weight maintenance, and obesity. It provides numerous health benefits, especially for overweight and obese individuals (Swift, 2013). Students who are wishing to lose weight should participate in physical activity to improve weight loss.

Effects of Physical Inactivity and Non-Aerobic Exercise

Physical Inactivity has effects to a person's heart rate. For instance, a fast heart rate is known as tachycardia, a medical term and commonly defined as a pulse rate greater than 100 (bpm) (Ahmed, 2017) or heart rhythm disorder. This is the abnormal electrical impulse starting in the upper or lower chambers of the heart.

Many people do not have symptoms of fast heart rate findings. They often just notice it when checking their pulse rate. They will feel tired, short of breath, dizzy, or fatigued. If the heart rate is particularly fast, there is a sensation of feeling of faintness or light-headedness.

When it is raised, it is a marker of cardiovascular risk. It is also a risk factor for cardiovascular events in heart failure (Bohm, 2010). Heart rate is an important target for the treatment of heart failure.

Furthermore, faster resting heart rates are associates with higher blood pressure. In other words, elevated pulse rate was associated with elevated blood pressure, increased risk for hypertension, cardiovascular disease, and hypertensives. Hypertension is a common clinical problem and a major risk factor for lung disease and stroke (Reule, 2012).

Also, the heart, like any other muscle, responds to the strain from exercise by getting stronger. With no exercise, you are not providing the stimulus your heart needs to get stronger, which can worsen your health.

On the other hand, hot getting enough physical activity can lead to heart disease, even for people who have no other risk factors. It can also increase the likelihood of developing other heart disease risk factors, including obesity, high blood pressure, cholesterol, and type 2 diabetes.

Lack of physical activity or having an inactive lifestyle will burn fewer calories, even it makes more likely to gain the weight. It loses muscle strength and endurance because muscles are not used. The bones will get weaker and lose some mineral content. The metabolism will be affected, and the body will have more trouble breaking down fats and sugars. The immune system will not work as well. It gives poorer blood circulation. The body will have more inflammation and develop a hormonal imbalance (Medline, 2017).

Further, lack of exercise will lead to regaining weight. To prevent, exercise is the most highly suggested and recommended in every individual (Winona, 2019). Some are tempted to stop exercising once they have already reached goal weight. With this, sickness may occur like stiffness, soft tissue tenderness, fatigue, sleep disturbances, cognitive difficulty, and mood disturbance (UFhealth, 2013).

Comparative Summary: Aerobic vs. Non-Aerobic Exercise

After exercising, a person's heart needs time to recover and return to its normal resting heart rate. How long it takes for the heart to resume its resting rate is referred to as heart-rate recovery time. People who exercise

regularly have healthier hearts, faster heart-rate recovery times, good circulatory system, and cardiovascular endurance. (Buddies, 2014).

People with exercise hypertension can experience spikes in systolic blood pressure up to 250 mm Hg during exercise. Exercise hypertension is a condition that causes an extreme spike in blood pressure during physical activity. In general, your blood pressure should return to normal within several hours of workout activity. Even then, you might notice that your blood pressure does not return to exactly what it was before a workout or exercise. That is because it is normal for blood pressure to drop slightly within a few hours of exercise (Vandergriendt, 2018). Aerobic exercises decrease body weight and reduce blood pressure among individuals. (Olivo, 2013).

Given this, physical activity includes leisure time, walking, dancing, gardening, hiking, and swimming to improve cardiorespiratory and muscular fitness (World Health Organization, 2019). Inactive adults or adults with disease limitations will have added health benefits of moving from the category of no activity to some levels of activity. A brisk walk for 30 minutes a day gives a healthier body. Healthy adults should get a minimum of 2-1/2 hours per week of moderate-intensity aerobic activity, a minimum of 1-1/4 hours per week of vigorous-intensity aerobic activity, or a combination of the two (Chan, 2013 & Southard, 2010). Adults should move more and sit less. Some physical activity is better than none. Adults who sit less and make any amount of moderate-to-vigorous physical activity gain some health benefits (Azar II, 2018).

Physical activity and physical fitness may influence health status during childhood and adolescence, and throughout adulthood. This paper addresses the evidence dealing with potential associations of physical activity and physical fitness in childhood and adolescence to health status during childhood, adolescence, and adulthood. There are generally low to moderate relationships between childhood and adolescent physical activity (operationalized mostly in health-related physical fitness). A large part of the variability in health-related fitness is not accounted for by physical activity as assessed in the available studies. Nevertheless, the trends emphasize the importance of a lifestyle of regular physical activity during childhood and adolescence, which continues into and throughout adulthood, for the health of the individuals and populations (Dobbins, 2013)

Physical activity is any body movement that works your muscles and requires more energy than resting. Walking, running, dancing, swimming, yoga, and gardening are a few examples of physical activity. Exercise is a type of physical activity that's planned and structured. Lifting weights, taking an aerobics class, and playing on a sports team are examples of exercise. Physical activity is good for many parts of your body. This article focuses on the benefits of physical activity for your heart and lungs. The article also provides tips for getting started and staying active. It discusses physical activity as part of a heart-healthy lifestyle (Panel, 2008) cited by (Dep. Health & Human Service, 2008).

Physical activity in daily life can be categorized into occupational, sports, conditioning, household, or other activities. Exercise is a subset of physical activity that is planned, structured, and repetitive and has as a final or an intermediate objective the improvement or maintenance of physical fitness. Physical fitness is a set of attributes that are either health- or skill-related. The degree to which people have these attributes can be measured with specific tests. These definitions are offered as an interpretational framework for comparing studies that relate physical activity, exercise, and physical fitness to health (Meyer, 2012).

Aerobic activities make you breathe harder and make your heart and blood vessels healthier. These include walking, dancing, swimming, water aerobics, jogging and running, aerobic exercise classes, and bicycle riding. Some are gardening activities, such as raking, and pushing a lawnmower, tennis, golfing with or without a cart (Kreitzer, 2014).

Among the aerobic activities, walking is one of the most effective exercises to improve cardiovascular endurance. Walking is considered a good aerobic fitness exercise because of its simplicity, low risk of injury, and adaptability to busy schedules (Weil, 2011).

Aerobic walking improves circulation. It also wards off heart disease, brings up the pulse rate, lowers the blood pressure, and strengthens the heart (Kemi, 2010). It is also improving the physical health components in quality of life and endurance in persons with chronic stroke, and it gives a health promotion strategy to a person (Gordon, 2013).

Aerobic Fitness reflects the ability to take oxygen from the atmosphere and use it to produce energy for the muscle cells. Understanding the various components of aerobic fitness will help train smarter to achieve optimal performance (Katch, 2010).

Aerobic Fitness is the ability of a person to take in, transport, and utilized oxygen. In aerobic work, oxygen is obtained from the air from the lungs to the blood and then to the muscles via the circulatory system. The maximal oxygen uptake or maximal aerobic power (VO2 max) is the indicator of aerobic fitness measured in a laboratory. As Vo2 max increases, the level of aerobic fitness also increases (Jones, 2010).

Cardiovascular exercise is one of the most important components of physical fitness. The other components are muscular strength, endurance, flexibility, and low-back function. Cardiovascular fitness is measured as the amount of oxygen transported in the blood and pumped by the heart to the working muscles and as the efficiency of the muscles to use that oxygen (Poole, 2012). Increasing cardiovascular fitness means increasing the capability of the heart and the rest of the cardiovascular system in their most important task, to supply oxygen and energy to your body (Gibson, 2014).

Having good cardiovascular fitness has many health benefits. For example, it decreases your risk of cardiovascular diseases, stroke, high blood pressure, diabetes, and other diseases.

Lastly, aerobic exercise appears to play an important role in reducing RHR, and it is effective at decreasing risk factors, such as weight, % body fat, and blood pressure (Kang, 2016).

Implications for Future Research

The reviewed literature affirms that aerobic exercise significantly contributes to improved cardiovascular health by lowering heart rate, reducing blood pressure, and promoting healthy weight management. However, while these findings are consistent and compelling, several research gaps remain that present opportunities for future exploration.

First, although studies such as those by Padilla (2010) and Battaglia (2013) highlight how aerobic conditioning leads to reduced resting heart rate and improved cardiovascular efficiency, future research could focus on identifying the most effective types and durations of aerobic activities across various age groups and fitness levels. Most studies emphasize walking, jogging, and swimming, yet little comparative work has been done to determine whether certain aerobic modalities (e.g., high-intensity interval training vs. moderate continuous training) yield superior benefits for specific populations.

Moreover, while Dimeo (2012) and Florida (2018) report that aerobic exercise is effective in reducing both systolic and diastolic blood pressure, particularly among hypertensive individuals, future studies should investigate the long-term sustainability of these effects. Longitudinal designs could track whether consistent engagement in aerobic activities maintains blood pressure control over the years and how these benefits evolve in aging populations or individuals with multiple comorbidities.

With respect to weight management, Jakicic (2012) and Swift (2013) provide compelling evidence on the role of aerobic exercise in preventing obesity and promoting weight loss. However, further research is warranted to assess the behavioral and psychological factors that influence adherence to aerobic exercise programs. Understanding these variables could lead to better-designed interventions, particularly for overweight and obese individuals struggling with long-term lifestyle changes.

Finally, while this review included findings on the negative cardiovascular effects of physical inactivity and non-aerobic behaviors (Ahmed, 2017; Bohm, 2010; Reule, 2012; Medline, 2017), future studies could explore the comparative risks between sedentary lifestyles and inconsistent physical activity patterns. Research could

also examine whether combining aerobic with resistance training offers synergistic benefits for cardiovascular outcomes—a topic not fully addressed in the literature reviewed here.

Grounded in the evidence presented, future research should aim to deepen our understanding of aerobic exercise by refining exercise prescriptions, targeting underserved populations, and evaluating the interaction of exercise with other lifestyle and medical interventions. These directions would enhance the translation of research findings into practice, supporting more personalized and effective approaches to cardiovascular health promotion.

CONCLUSION

The findings of this literature review affirm that aerobic exercise plays a vital role in improving cardiovascular health. Regular participation in aerobic activities—such as walking, running, and swimming—has been consistently shown to reduce resting heart rate (Padilla, 2010; Schwartz, 2014), lower both systolic and diastolic blood pressure (Dimeo, 2012; Florida, 2018), and support weight management (Jakicic, 2012; Swift, 2013). These outcomes contribute to a reduction in the risk of cardiovascular diseases and promote overall physiological well-being. The reviewed evidence strongly supports the role of aerobic exercise not only as a preventive health strategy but also as a non-pharmacological intervention for individuals with existing cardiovascular conditions.

In light of these findings, it is recommended that individuals incorporate moderate to vigorous aerobic activities into their regular routines to maintain and improve cardiovascular health. Health professionals and educators should emphasize the integration of aerobic exercise into daily life, particularly among populations at risk for hypertension, obesity, and cardiovascular disease. Public health programs and community-based initiatives should also promote accessible and sustainable aerobic exercise interventions.

Moreover, fitness programs should be tailored to consider age, fitness level, and health status to maximize engagement and effectiveness. As future studies refine the optimal duration, intensity, and type of aerobic exercise for diverse populations, these recommendations may evolve to offer even more personalized and impactful guidance.

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