REVIEW

The impact of both resistance and aerobic training on weight control management

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ABSTRACT

Obesity has been appearing as a challenging health problem for years all over the world. For this reason, numerous treatment methods have been carried out, and among them, physical exercises have been underlined. While aerobic activities such as cycling and jogging assist in weight loss in obese patients, recent studies recommend that both anaerobic exercises are beneficial and should be combined. In the search for scientific literature related to this review, the US National Library of Medicine (PubMed) used MEDLINE and SportDiscus data, and the terms "aerobic exercise", "anaerobic exercise", "physical exercise", and "obesity" were used. The relevant literature has also taken its source from the research of relevant articles from reference lists derived from data studies. Physical exercise has a significant role in treating and preventing obesity and overweight. In this sense, since aerobic and anaerobic exercises have been reported to provide benefits, they should be merged, and this combination should be integrated into exercise programs for obese patients. Although generally aerobic exercise is recommended since it might present actual results in obesity disease, recent studies point out that anaerobic exercises are also practical. Aerobic and anaerobic exercises together provide far better consequences.

Keywords: obesity, anaerobic exercise, aerobic exercise, training

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INTRODUCTION

In recent years, the world has faced a severe health problem that threatens people's lives and affects different age groups, such as adults and children. This health issue is addressed as obesity, and according to the definition made by the WHO, obesity, and overweight are explained as "abnormal or excessive fat accumulation that may impair health" [1]. Based on body mass index (BMI), a BMI over 25 kg/m^2 is accepted as overweight, while a BMI over 30 kg/m^2 is associated with obesity [2]. As the prevalence of this disease and the number of people suffering from obesity has been increasing all over the world, a wide range of studies have also been carried out to provide treatments, understanding the causes behind it, the relation between obesity and other diseases, and so on. As a result of this, a significant number of studies prove that obesity is also associated with being a risk factor for other chronic diseases such as hypertension, type 2 diabetes, depression, coronary heart disease, breast/colon cancer, and so on1, which might lead to adult morbidity and mortality. But what are the main factors behind this health problem? Physical inactivity, overeating, genetics [3], consuming processed and fast food, and others are the main factors of obesity and being overweight [4, 5]. Considering this, it would not be wrong to state that, among all these factors, a sedentary lifestyle is an essential contributor to the development of obesity and overweight. Technological developments might also affect a sedentary lifestyle [6], including sitting in front of screens such as television or computer and spending hours without engaging in any minor physical activity. Therefore, to abstain from sedentary life, adopting a lifestyle, which includes physical activities and exercises, is a crucial behavior to fight against this disease, and it also plays a role in the prevention of obesity [7].

According to many conducted studies, physical exercise is widely known to be very effective on the mental and body health of people with chronic diseases [8,9,10]. In addition, considering that excessive fat in the body is correlated with obesity and overweight, it is reported that physical exercise is very effective in weight loss and its maintenance since it helps fat burn [11,12]. Therefore, particularly during the treatment and prevention of obesity, physical exercise is strictly recommended. For instance, it has essential roles in metabolic effects, such as advancing lipid metabolism and body capacity to manage glucose loads, which will benefit obese patients during their treatment [13]. Besides, studies show that although diet alone significantly impacts the body, it becomes considerably more effective when supported with physical exercise during the weight-loss period [11]. Besides this, since training could advance sympathetic and parasympathetic nervous activities, which are lower in obese patients, it might provide benefits to managing obesity [14]. In this sense, the main question would be what type of physical exercise could benefit both in preventing and treating obesity. At this point, it would be necessary to point out the impact of aerobic and anaerobic exercises on obese and overweight patients.

First of all, being one of the most well-known methods of losing weight, aerobic exercise is defined as any activity that can be

carried out constantly, be rhythmic, and includes large groups of muscle by The American College of Sports Medicine (ACSM) [15]. Aerobic exercises, expected to help weight loss, might be stated as cycling, hiking, jogging, swimming, and walking. According to the ACSM, aerobic capacity, which results from the cardiorespiratory system's ability to provide oxygen and skeletal muscle capacity to benefit from oxygen, could be obtained with these activities [15]. In addition, it is reported that a short-term diet combined with aerobic exercise positively impacts obese patients [16] since aerobic exercises help weight loss by increasing energy expenditure [17,18]. Considering this, The American College of Sports Medicine and the American Heart Association recommend that obese patients perform moderate-intensity aerobic exercises for at least 30 minutes 5 days a week or vigorous-intensity aerobic exercises for at least 20 minutes three days a week [19].

On the other hand, anaerobic exercises have recently been studied and discussed to understand whether they would be beneficial during the phase of obesity treatment and would provide significant effects on the body in the prevention of this disease. According to the definition of the ACSM, anaerobic exercise is a type of intense physical activity that consists of a brief period containing energy sources in contracting muscles [20]. Examples of anaerobic exercises, sprinting, high-intensity interval training (HIIT), powerlifting, resistance training, and so on could be underlined. This type of exercise leads to an increase in lactate and metabolic acidosis, which is indicated as an anaerobic threshold (AT) [21]. In addition, studies point out that exercises referred to as anaerobic threshold causes a significant decrease in fat mass [22]. Among all anaerobic exercises, high-intensity interval training (HIIT) has recently become prominent, and it involves a short period of high-intensity exercise [23]. It is also reported that HIIT exercises could lead to an increase in aerobic capacity. This type of exercise might be helpful so that the amount of time could be saved with short periods of exercise [24,25]. Resistance training, a part of anaerobic exercises, has recently been reviewed. It was found that this type of exercise could be adopted into the training program of obese patients since it could be carefully performed by adults and children [26,27]. In addition, in young obese people, low aerobic fitness levels are observed and might emerge as a problem since this might reduce the intensity of endurance exercises. However, during resistance exercises, the high muscle mass of obese young patients might become an advantage, contrary to endurance training [28,29]. In this way, resistance exercises could influence obese patients to maintain regular exercise.

Although the positive impacts of aerobic exercises on obese patients are proven and thus recommended during the treatment period in general, anaerobic exercises (HIIT, resistance training, etc.) have also been determined to pave the way for significant results in this regard. In addition, in consideration of the advantages of both aerobic and anaerobic exercises on obese and overweight patients, it might be stated that both of them are proven to be effective in many different aspects in the prevention of obesity or during the treatment period. As stated before, if aerobic and anaerobic exercises are combined and adapted into the training program of obese patients, they could provide many more benefits and even assist in protecting the body after weight

loss. In a study carried out by Willis et al. on different groups related to aerobic, resistance, and a combination of aerobic and resistance training, it was found that the group of the mixture has the highest rate of fat mass loss

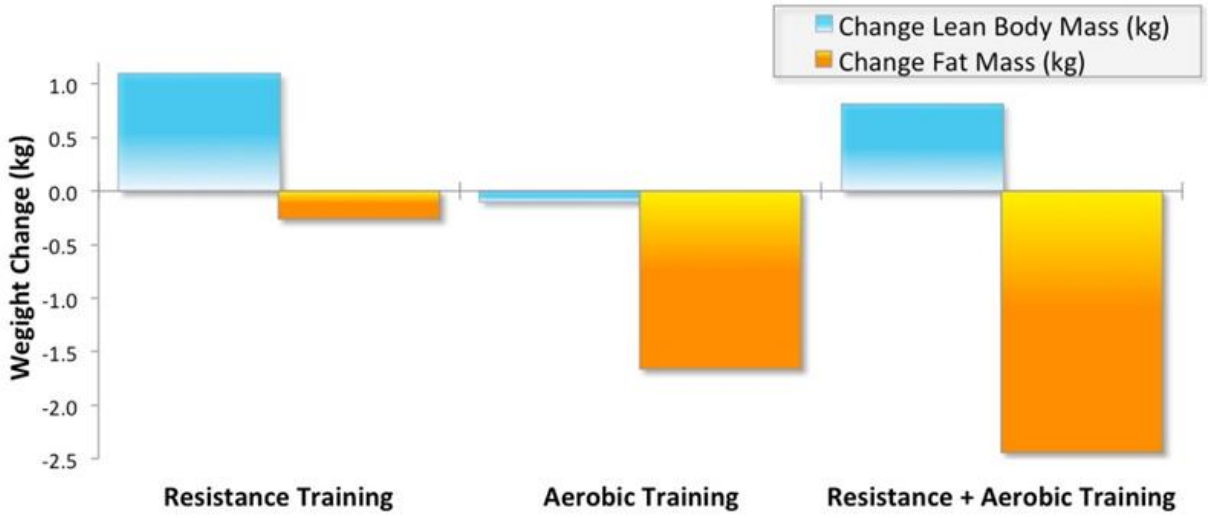

Figure 1. A figure demonstrating the weight changes resulting from resistance, aerobic, and both resistance and aerobic training on the body, including fat and lean body mass. In resistance training, there is a 1-kg-increase in lean body mass, whereas a rate between 0 and -0.5 kg. is the loss in fat mass. In addition, in aerobic training, there is a decrease in lean body mass, while almost -1.5 kg. is lost in fat mass. In the group of the combination of resistance and aerobic training, however, there is a decrease at a rate between -2.0 and -2.5 kg. in fat mass, whereas there is an increase at a rate over 0.5 kg in lean body mass [30].

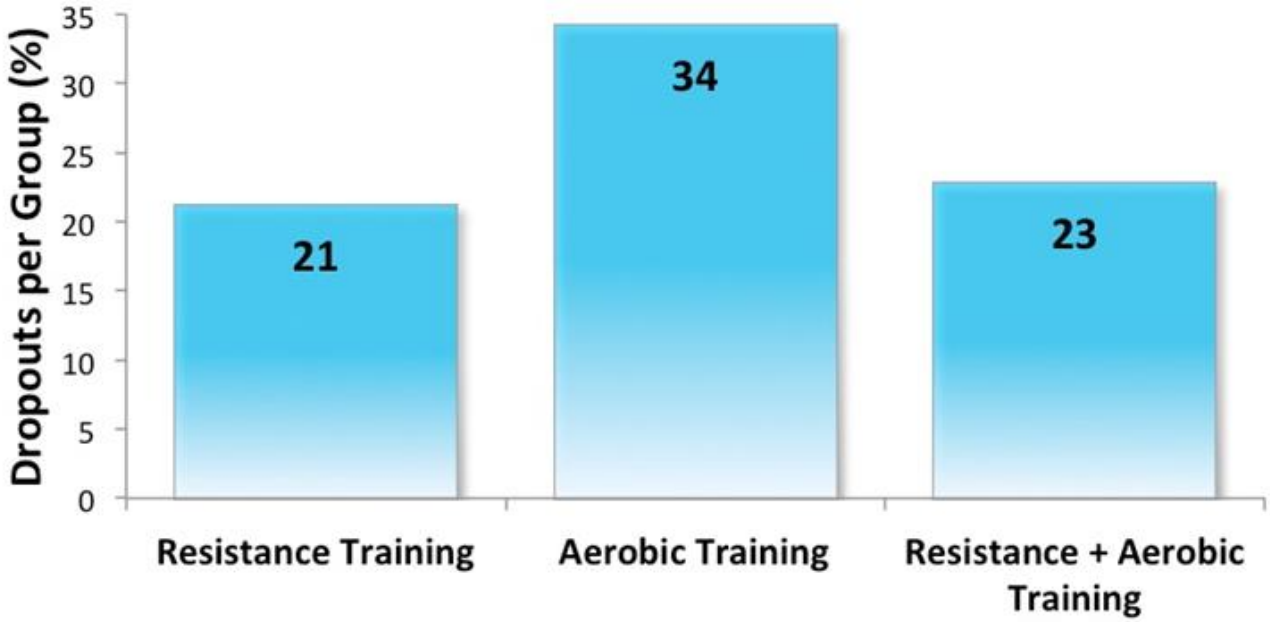

Figure 2 shows the dropout rates per group of resistance training, aerobic training, and the combination of both resistance and aerobic exercise. The dropout rate of resistance training is 21%, whereas it is 34% in the aerobic training group. In addition, the speed of the group of resistance and aerobic training combination is 23% [30].

and a better rate of lean mass change than the aerobic only group [30], which shows us that weight loss with the combination of aerobic and resistance training might provide a more satisfying result since the improvement on lean mass is also achieved.

On the other hand, another point that should be discussed is the persistence and determination to perform exercises to achieve desired results. In this context, obese patients should follow their exercise program and adapt. As various factors such as duration, intensity, rest times, and so on play an essential role in this persistence, patients should be informed about their limits, and their exercise programs should be regulated based on this. In the same study of Figure 1, which is carried out by Willis et al., it is found that the highest dropout rate of exercises is observed in the aerobic group. In contrast, the groups involving resistance have fewer dropout rates [30], which might be because patients' motivation might change depending on the content or duration of exercise programs.

DISCUSSION

A study on 16 obese subjects shows that aerobic exercise combined with aerobic training provides more benefits than only aerobic training. The same study found that these subjects' non-esterified fatty acids and body mass index (BMI) values were decreased [31].

In a study by Sgro et al. to understand the impact of resistance training duration on the body of children whose ages vary between 7-12. Participants performed resistance training thrice a week for either 8, 16, or 24 weeks. As the result of this study, it is found that after eight weeks of training, the body fat of children is reduced at a rate between 5% to 7%. In contrast, after 16 weeks, body fat reduction is observed approximately at a rate of 8.1% [32], which also suggests that resistance training, as an anaerobic exercise, could positively impact overweight and obese children in terms of body fat and weight control.

Another study found that aerobic exercise for at least 60 minutes and 3 times a week might reduce LDL-C and TG concentrations. Combining aerobic and anaerobic exercises could provide more benefits, such as increasing HDL-C [33].

Furthermore, De Piano et al. studied the effect of combining both resistance and endurance training versus only endurance exercise training. It is reported that these exercises improve insulin and alanine transaminase concentrations, HOMA index, adiponectin, and leptin concentration and reduce melanin-concentrating hormones in obese adults with non-alcoholic fatty liver disease [34].

In addition, according to the study of Avila et al. [35]. Carried out on obese and

overweight men and women whose ages vary between 60-75 to see the impact of moderate-intensity resistance training and weight loss group versus weight loss only group for ten weeks, it is reported that the group involving moderate-intensity resistance exercises are observed to have a more significant decrease in fat mass as well as leg strength improvements.

CONCLUSION

The world has been struggling against obesity for years and this disease has increasingly been widespread among adolescents and children for many reasons. As a result, many studies have been conducted in recent years, and numerous new methods have been put forward to prevent obesity or find proper treatments for it. Among these methods, exercise status could not be ignored since its positive effects have already been proven multiple times in different studies. In this sense, when aerobic and anaerobic exercises are discussed separately, it is clear they both could provide significant results for obese patients. However, on the condition that they are combined, they become a much more effective and robust method in obesity treatment. They could fight against obesity and overweight more powerfully. Therefore, the effect of anaerobic exercises should also be considered, and this combination should be more involved in exercise training programs of obese patients. In addition, various factors such as intensity and duration should be considered while planning this training.

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