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The role of physical activity in the prevention and treatment of obesity - a review of clinical studies

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ABSTRACT

Obesity is described as an excess or abnormally high level of body fat which can have an adverse effect on health. It is a complex chronic condition that results from the interaction of genetic susceptibility, environmental influences, energy intake and energy expenditure. The rate at which obesity is occurring has gone up all over the world and at present about one in eight people is affected. Physical activity is a vital component of both the prevention and management of obesity since it raises energy expenditure, improves general health and helps to maintain muscle mass. *Aim:* The purpose of this review is to bring together the existing evidence regarding the role of physical activity in avoiding and managing obesity. *Methods:* The review was based on scientific publications retrieved from PubMed, the Cochrane Library, Scopus, and Google Scholar. Only papers published between 2014 and 2026 were considered. *Conclusions:* Physical activity is an important part of obesity prevention and treatment and may help reduce the risk of developing obesity. On its own, however, it is often not sufficient to produce clinically relevant weight loss. For this reason, exercise should be combined with appropriate dietary measures as part of a broader weight-management strategy.

Keywords: obesity, physical activity, prevention, treatment, weight loss

1. INTRODUCTION

According to the WHO, obesity is described as an excessive accumulation of fat which is a threat to health. For adults, a BMI between 25.0 and 24.9 is classified as being overweight, while a BMI of 30 kg/m² or above is considered to be obesity (World Health Organization, 2025).

According to the WHO criteria, adult BMI can be classified into the following categories:

- * Normal weight: 18.5 - 24.9 kg/m²
- * Overweight: 25.0 - 29.9 kg/m²
- * Obesity class I: 30.0 - 34.9 kg/m²
- * Obesity class II: 35.0 - 39.9 kg/m²

* Obesity class III: $\geq 40.0 \text{ kg/m}^2$

BMI should not however be taken by itself. Factors such as muscle mass, hydration, pregnancy, the accumulation of fluid in the third space, the presence of large tumours, and lipodystrophy can all affect how BMI is interpreted in a clinical setting. Even though BMI is still a useful tool for screening at the population level, it does not give a direct measure of body fat and may as a result lead to an inaccurate evaluation of health risk in certain people. Present expert guidelines recommend that, when it is appropriate to do so, excess adiposity should be confirmed by means of further anthropometric measurements or other methods of body-composition assessment (Rubino et al., 2025).

Epidemiology

Obesity is now far more prevalent all over the world. In 2022 approximately 43% of adults worldwide were overweight and 16% were obese. Among children and adolescents aged 5-19 years, obesity became approximately four times more prevalent between 1990 and 2022 (NCD Risk Factor Collaboration, 2024).

According to data provided by Poland's national authorities for 2025, excessive body weight—defined as a BMI of 25 kg/m² or more—is recorded in 64% of adult men and 48% of adult women, while obesity—defined as a BMI of 30 kg/m² or more—affects 15% of men and 13% of women (Wojtyniak and Smaga, 2025). In the same year, the CMKP also considers obesity to be a major public health concern in Poland and notes that excessive body weight is found in 56% of adults (Grudziąż-Sękowska and Jankowski, 2025).

Health consequences of obesity

Obesity is a well-established precursor to numerous chronic health conditions. The excess accumulation of adipose tissue has a negative impact not only on metabolic function but also on the endocrine and cardiovascular systems as well as on mental health. It is now established that obesity is not simply a matter of appearance but rather a chronic disease linked with a variety of health problems and with reduced quality of life and shorter life expectancy (Blüher, 2019).

Metabolic complications are common in people with obesity, notably insulin resistance and type 2 diabetes, and visceral adiposity may contribute through chronic low-grade inflammation and impaired glucose metabolism. Such metabolic disturbances may impair insulin sensitivity and consequently increase the likelihood of type 2 diabetes. It has also been shown that metabolic disorders occur more often in people who are obese than in those with a normal body weight (Ruze et al., 2023).

Obesity is linked to a greater extent of cardiovascular disorders, such as atherosclerosis, hypertension, ischemic heart disease, and heart failure; the main mechanisms at play are chronic inflammation, endothelial dysfunction, and dyslipidemia. It has recently been shown that cardiovascular risk increases as BMI rises (Haider and Horwich, 2023).

Excess adiposity is associated with several cancers, including colorectal, breast, endometrial, and pancreatic cancer. Mechanisms include chronic inflammation, hormonal imbalances, and increased production of pro-inflammatory mediators by adipose tissue (Pati et al., 2023).

Obesity also has a negative effect on the musculoskeletal system; in people who have excess fat tissue degenerative changes in the knee and hip joints may occur due to the increased mechanical stress. Furthermore, obesity can lead to a reduction in physical activity and a lower level of functional capacity in everyday life (Shumnalieva et al., 2023).

Obesity can also have an effect on mental health since inflammation together with the psychological stress caused by weight stigma may lead to depression and anxiety; and in turn mood disorders may cause people to eat too much and make it more difficult to achieve long-term weight management (Westbury et al., 2023). Preventing and treating obesity may help reduce chronic disease risk while supporting better quality of life and longer life expectancy.

The importance of physical activity

In order to achieve effective treatment of obesity, one must take part in regular physical activity. Engaging in regular exercise raises energy expenditure and is beneficial for general health. Research that is currently available shows that sufficient physical activity reduces the incidence of the metabolic and cardiovascular diseases linked to obesity (Oppert et al., 2023).

A major way in which physical activity helps with weight control is by increasing total energy expenditure. Since resting metabolic rate is strongly affected by fat-free mass, maintaining lean mass during weight loss might help reduce the drop in energy expenditure that occurs as a result of losing weight (Argyropoulou et al., 2023).

Because of regular exercise, insulin sensitivity is improved and this may in turn reduce the risk of developing type 2 diabetes. The physical exertion involved causes skeletal muscle to take up more glucose and results in better glycemic control. Furthermore, exercise can reduce triglyceride levels and raise the concentrations of HDL cholesterol, thus leading to a more favorable cardiovascular risk profile (Jamka et al., 2022). Physical activity may also benefit mental health, as systematic reviews have linked higher activity levels with a reduce susceptibility to depression and anxiety and with improved psychological well-being (Wanjau et al., 2023).

Physical activity is most effective for the treatment of obesity when it is combined with changes to one's diet; programs that involve both exercise and a modification of eating habits result in better outcomes with regard to weight. It is also important to continue with physical activity if the results of the treatment are to be maintained over time (Olateju et al., 2023).

The World Health Organization (2020) suggests that adults should carry out 150 to 300 minutes of weekly moderate-intensity exercises each week or 75 to 150 minutes of vigorous-intensity activity; sticking to these recommendations contributes to good general health and aids in the prevention of diseases associated with a sedentary lifestyle.

As obesity becomes increasingly prevalent and affects both physical and psychological health, greater attention has focused on the role of physical activity in warding off and managing. Exercise on a regular basis might help with weight loss, lead to better metabolic health, and thus reduce the risk of complications associated with obesity. This review examines current scientific evidence linking physical activity to obesity prevention and treatment.

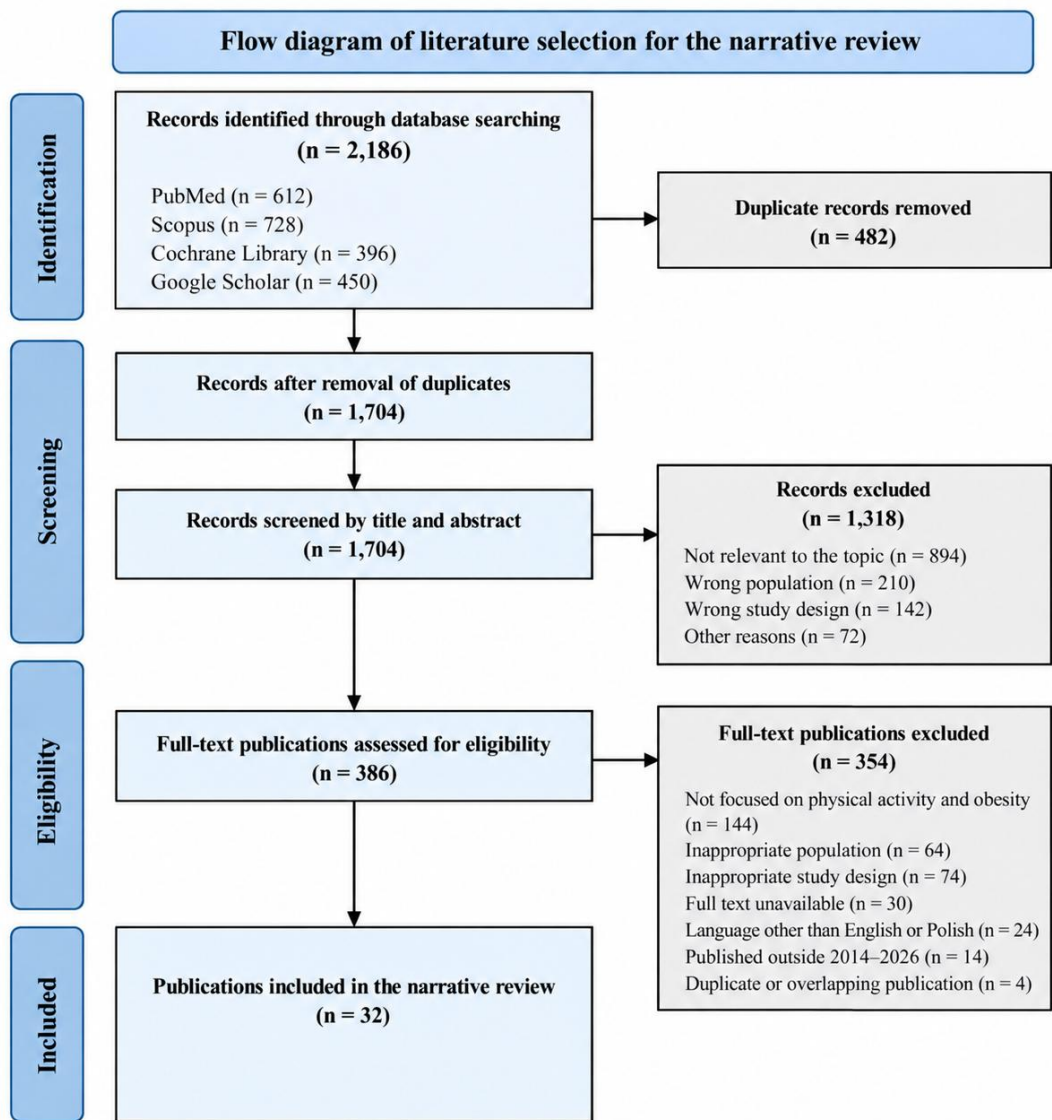


Figure 1. Flow diagram of literature selection for the narrative review

2. REVIEW METHODS

This narrative review evaluates clinical studies and systematic reviews investigating the relationship between physical activity and obesity. Pertinent studies were identified by searching PubMed, the Cochrane Library, Scopus, and Google Scholar. Publications issued between January 1, 2014, and March 2026 were considered. The search strategy used the following terms: “obesity,” “physical activity,” “exercise,” “obesity treatment,” “obesity prevention,” “aerobic exercise,” “resistance training,” and “HIIT.”

Studies were considered eligible if they involved adult or pediatric populations and included randomized clinical trials, meta-analyses, or systematic reviews. We considered only full-text publications available in Polish or English. To be included, a study had to assess the role or effectiveness of physical activity in obesity prevention or treatment. The process of literature selection is presented in Figure 1.

3. RESULTS AND DISCUSSION

The effect of physical activity on weight reduction

Physical activity is an essential part of treating obesity and can help with losing body weight. When people exercise regularly, their energy expenditure increases, which helps to produce the negative energy balance needed to reduce fat tissue. Physical activity can also improve body composition by preserving muscle mass during energy restriction and supporting resting energy expenditure. Clinical evidence shows that when people who are overweight or obese take regular aerobic exercise, both their body weight and waist circumference decrease.

A meta-analysis carried out by Jayedi et al., (2024) found that the more aerobic exercise people carried out, the more there was a gradual decrease in their body weight, body fat, and visceral fat. The researchers also found a dose-response relationship in that a higher number of minutes of aerobic exercise per week was linked to greater reductions in adiposity measures.

Bellicha et al., (2021) reached similar conclusions, demonstrating that structured exercise is able to reduce body weight and adiposity in adults who are overweight or obese. Moreover, their review suggested that resistance training might help in preventing a loss of lean mass when weight is being reduced, although the evidence regarding long-term weight maintenance is still limited.

The kind of training and its structure are also significant. Exercises that improve aerobic capacity, such as walking, running and cycling, are effective in reducing adipose tissue (Oppert et al., 2023). Resistance training, on the other hand, helps to maintain or increase muscle mass and may contribute to resting energy expenditure. Furthermore, there is evidence in support of high-intensity interval training (HIIT) as a time-efficient method which can yield benefits similar to those of longer-duration continuous exercise (Sanca-Valeriano et al., 2023).

Although physical activity is an established part of obesity treatment, its effectiveness depends on several factors, including exercise frequency, program intensity and structure, and adherence to dietary recommendations. Exercise tends to produce the greatest benefit when it is included in a broader lifestyle intervention.

The effect of physical activity on metabolic parameters

Even in individuals who are overweight or obese, exercise can improve metabolic health even if there is only a small change in body weight. Various studies have found favorable effects on glucose control, lipid metabolism, and cardiovascular function. It therefore follows that one should not judge the response to exercise solely on the amount of weight lost.

A major metabolic advantage of taking regular physical activity is an increased insulin sensitivity. Because of exercise, skeletal muscle is able to take in more glucose and the action of the glucose transporters is improved. Such adaptations could lead to better regulation of blood glucose levels and may reduce the chance of developing type 2 diabetes. It is currently believed that both aerobic and resistance exercise can improve glycemic regulation in people who are obese (Engin et al., 2022).

Physical activity can likewise have a beneficial effect on the lipid profile; in adults who are overweight or obese, exercise programs may lead to a reduction in triglycerides, total cholesterol, and LDL cholesterol together with an increase in HDL cholesterol, although the size of these effects differs according to the interventions and populations involved (Khalafi et al., 2023).

Physical activity regularly carried out can also aid in better control of blood pressure and in lowering the total cardiovascular risk. Exercise is regarded as a key lifestyle measure for reducing cardiovascular risk in current prevention guidelines, including for individuals who are overweight or obese (Visseren et al., 2021). Taken together, these findings show that exercise can improve metabolic health even when weight loss is small. Aerobic training, as well as programs that combine aerobic and resistance exercise, may be especially beneficial when performed regularly and maintained over time as part of broader lifestyle changes.

Comparison of different forms of physical activity

Various forms of physical activity are employed as part of the treatment of obesity and they may influence body weight, body composition, and metabolic factors in different ways. The types of training that have been studied most often are aerobic training, resistance training, and high-intensity interval training (HIIT). It is currently believed that each of these offers health benefits, though their relative effectiveness will vary according to the therapeutic objective (Chen et al., 2024).

Aerobic training is one of the most frequently recommended types of physical activity for the treatment of obesity; it involves exercises such as walking, running, cycling and swimming. Because of its relatively high energy expenditure it can facilitate reductions in body weight and adiposity. Studies have found that regular aerobic training leads to favorable changes in body weight, waist circumference, and visceral fat deposition, larger effects usually being linked to a higher exercise frequency and duration (Bellicha et al., 2021).

Resistance training, or strength training, is effective in maintaining or increasing lean mass; for those who are overweight or obese, systematic reviews have shown that resistance exercise can improve body composition, reduce fat mass and preserve or increase lean mass, particularly when it is part of multicomponent weight-management programmes (Lopez et al., 2022).

High-intensity interval training (HIIT) consists of short periods of intense exercise alternated with recovery intervals. It has been shown that HIIT can produce metabolic benefits that are equal to or greater than those obtained through conventional aerobic training, even though it takes less time; in addition, HIIT has been found to improve cardiorespiratory fitness, reduce body fat, and increase insulin sensitivity (Edwards et al., 2023).

The available evidence indicates that combining various types of physical activity will yield the greatest health benefits; programs that involve both aerobic and resistance exercises are able to reduce adipose tissue while at the same time helping to maintain muscle mass; current guidelines thus recommend a comprehensive approach which is tailored to the individual patient's needs and capabilities.

Physical activity in the prevention of obesity

It is important to have a physical activity routine if you want to prevent obesity and lead a healthy lifestyle. Exercise helps to increase energy expenditure and maintain a healthy body weight, thus contributing to an energy balance. Longitudinal evidence suggests that adults who maintain higher physical activity levels correlate with a decreased incidence of developing obesity (Cleven et al., 2020).

The preventive benefits of physical activity extend beyond its contribution to energy expenditure. Exercise can also improve cardiometabolic health. In adults with overweight or obesity, regular training has been associated with lower insulin resistance and blood pressure as well as reduced intrahepatic fat, showing that its benefits may occur even without major changes in body weight (Battista et al., 2021).

It is also important to prevent children and adolescents from becoming overweight or obese through physical activity. If children and adolescents develop regular exercise habits early in life, this may help them to keep a healthy body weight. Prospective studies have shown that maintaining higher levels of physical activity—especially moderate-to-vigorous and vigorous activity—is linked to more favorable outcomes with regard to overweight and obesity in children and adolescents (Georgoulis et al., 2026).

Another key part of preventing obesity is to reduce sedentary behavior. Data from a systematic review and meta-analysis reveal a link between sedentary behavior, physical inactivity, and obesity in both adults and older adults. Regular exercise may counter some adverse consequences of prolonged sedentary behavior by increasing energy expenditure and supporting metabolic health (Silveira et al., 2022).

The WHO recommends that adults should carry out between 150 and 300 minutes of moderate-intensity physical activity each week or between 75 and 150 minutes of vigorous-intensity activity. Meeting these recommendations could help in reducing the risk of obesity and of many chronic diseases associated with excess body weight (World Health Organization, 2020).

Consistent physical exercise constitutes a cornerstone in element of obesity prevention. Its benefits are greatest when activity is maintained over time and sedentary behavior is reduced. For this reason, encouraging an active lifestyle remains an important part of public health efforts aimed at limiting the prevalence of obesity. The main findings regarding the role of physical activity in obesity prevention and treatment are summarized in Table 1.

Table 1. Summary of the main findings regarding the role of physical activity in obesity prevention and treatment

Aspect	Main findings
Body weight and adiposity	↓ body weight, body fat, waist circumference and visceral fat
Metabolic health	↑ insulin sensitivity and glycemic control; improvement in lipid profile and blood pressure
Aerobic exercise	Mainly supports reduction of body fat and adiposity
Resistance training	Helps preserve or increase lean muscle mass
HIIT	Provides metabolic and fitness benefits with shorter exercise duration
Obesity prevention	Regular activity supports healthy body weight and reduces effects of sedentary behaviour
Combined approach	Exercise combined with dietary modification generally provides better outcomes

The clinical evidence reviewed in this paper supports an important role for physical activity in both the prevention and treatment of obesity. Most of the included publications report favorable effects of regular exercise on body weight, body composition, and metabolic parameters (Battista et al., 2021; Bellicha et al., 2021). However, the magnitude of these effects depends on the type of exercise, its intensity and frequency, and the duration of the intervention (Jayedi et al., 2024; Oppert et al., 2023).

Aerobic exercise is linked to a lower body weight and reduced adiposity. In the meta-analysis carried out by Jayedi et al., (2024), the more aerobic exercise people carried out, the greater the reductions in both their body weight and fat mass. Bellicha et al., (2021) too noted favourable changes in body composition, with a reduction in visceral fat. The effect on weight seems to be more noticeable when exercise is combined with appropriate dietary changes (Olateju et al., 2023).

Exercise also has metabolic advantages that do not rely on substantial changes in body weight (Battista et al., 2021). The studies cited in this review found that among people who were physically active, there were improvements in insulin sensitivity, glycemic control, and lipid profiles (Battista et al., 2021; Engin et al., 2022; Jamka et al., 2022; Khalafi et al., 2023). These findings demonstrate that the therapeutic benefits of exercise extend well beyond weight loss alone.

Aerobic, resistance, and interval training do not produce identical effects (Chen et al., 2024). Aerobic exercise is more often linked with reductions in body fat, while resistance training is mainly used to preserve or increase muscle mass (Bellicha et al., 2021; Lopez et al., 2022). HIIT may offer metabolic benefits despite a shorter training duration (Edwards et al., 2023; Sanca-Valeriano et al., 2023). For this reason, combining aerobic and resistance exercise can be useful when several therapeutic goals need to be addressed at once (Olateju et al., 2023).

The studies in question also show how important it is to carry out physical activity as a means of preventing obesity (Cleven et al., 2020). Maintaining a regular exercise routine helps to maintain a healthy body weight, offsets the negative effects of a sedentary lifestyle, and lowers cardiometabolic risk (Battista et al., 2021; Silveira et al., 2022). Encouraging children and teenagers to be physically active is important because the habits they form early on can impact their health as they grow older (Georgoulis et al., 2026).

The studies in this review were quite different from one another. They used different numbers of participants, lasted for different periods of time, and used different exercise programs. Diet was not always controlled, so it may have affected some of the results. In some studies, the follow-up period was also short. As a result, it becomes difficult to assess the long-term effects of physical activity.

In general, physical activity can be of assistance in both preventing and treating obesity; it might lead to an improved body composition and metabolic health, and these effects are generally more beneficial when physical activity is paired with dietary modifications and carried on for a longer period of time (Battista et al., 2021; Bellicha et al., 2021; Olateju et al., 2023; Wharton et al., 2020).

4. CONCLUSION

It is important for both the prevention and the treatment of obesity that physical activity be carried out, a conclusion which is supported by a great deal of research. Exercise does not simply result in a reduction of body weight and fat but actually leads to a fundamental change in body composition. Moreover, physical activity actively enhances several metabolic indicators, including insulin sensitivity and glucose uptake as well as lipid levels and blood pressure. Aerobic, resistance, and interval training can each play a different role in obesity treatment. Aerobic exercise is mainly used to reduce body fat, while resistance training helps protect muscle mass. HIIT can be useful for people who have less time for longer exercise sessions. In practice, using more than one type of training together with dietary changes may give better results.

The reviewed evidence also supports the importance of physical activity in preventing obesity and its associated health complications. Promoting an active lifestyle should therefore be a core component of public health strategies aimed at reducing the prevalence of obesity. Regular physical activity can help people with overweight or obesity manage body weight and improve metabolic health. It should therefore remain part of both prevention and treatment.

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Conflict of interest

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Data and materials availability

All data associated with this study will be available based on the reasonable request to the corresponding author.

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