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Commentary

The role of exercise in obesity

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Obesity is a condition characterized by an excessive accumulation of body fat to an extent that health is endangered. It is usually defined by using the body mass index (BMI; kg/m^2), where a BMI higher than 25 kg/m^2 is often used as an index of overweight, while a BMI higher than 30 kg/m^2 is used as a cut-off point to indicate obesity [1]. Many observational studies have revealed a relationship between physical inactivity and obesity, as well as that physical exercise leads to a reduction in fat mass and abdominal obesity. Moreover, there is strong evidence that physical activity is important for maintaining body weight after weight loss and for preventing weight gain in general [1–3], while it is a modifiable risk factor for reducing the risk of cancer-mortality [4,5] or cardiovascular disease [6,7] among individuals who have overweight or obesity Although there are exceptions, it is generally agreed that non-obese individuals are more physically active than overweight and obese individuals while, further, physical activity partially prevents the ageing-associated weight [8]. An association was also confirmed between physical inactivity and weight gain in children and adolescents [9]. Although the evidence from the observational studies consistently suggest a crucial role of physical inactivity in the development of obesity, however more randomized controlled trials are required to corroborate this evidence [1].

A large weight loss has been observed in obese men after short intervention programs in which exercise was the sole or main form of intervention, however long-term follow-up studies revealed that the initial weight loss was followed by weight regain [1,10]. Genetic factors may have a role in the extent of weight loss with exercise, suggesting that exercise may be more effective for weight loss or for avoiding weight gain in some individuals compared with others [11,12].

Dietary intake is also another determinant that influences the effectiveness of exercise for the prevention and management of obesity. Thus, it has been suggested that by changing energy balance by 100 kilocalories per day, which for instance, corresponds to 15 min of walking per day, in addition to existing activity, and maintaining it as a habit throughout life, could be effective for preventing weight, assuming that energy intake will not increase to compensate for this additional activity [1,13]. However, a higher recommendation regarding the amount of exercise needed to prevent weight gain has been given by other studies and the ACSM position stand for weight loss and prevention of weight regain through physical activity, such as 30 minutes of moderate-intensity physical activity on most, if not all, days of the week, or moderate-intensity physical activity between 150 and 250 min·per week, or even up to 420 minutes per week for an effective weight control [2,14]. It should be mentioned that the guidelines for weight loss assume that the reduction of energy intake is 500–1000 kilocalories per day while at the same time energy expenditure increases [1].

Although exercise can effectively reduce weight without concurrent dietary intervention, exercise is most likely to be effective when it is combined with diet, which also applies in reverse [1,2]. In the ACSM Position stand [14], clear and comprehensive guidance for intervention strategies for weight loss and prevention of weight regain through exercise is provided, while certain ambiguities useful for informing clinical practice about the role of exercise in treating obesity are also available [15]. Overall, energy expenditure appears to be the most important factor for weight loss with exercise [16] and given that the exercise-induced energy expenditure is sufficient, the type or mode of exercise may not matter [17]. Indeed, weight loss is expected by physical training as it increases energy expenditure and induces lipolysis resulting in reduction of

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fat mass. Nevertheless, as the most effective mode of exercise for expending energy is aerobic exercise, it has been suggested that exercise duration may be more important than exercise intensity for weight loss [1]. Thus, a large volume of moderate-intensity aerobic exercise, preferably in combination with strength training, has been recommended for weight loss [2]. However, a Cochrane review has revealed that high-intensity physical activity was more effective than moderate activity for weight loss [18], while in studies involving only physical training without dietary intervention, it was shown that high-intensity exercise reduced body weight more than low-intensity physical training (reviewed in [2]). Exercise does not need to be structured, since diet and lifestyle activities are effective for weight loss similarly to diet plus structured aerobic exercise [1].

With regard to the prevention of weight regain through exercise, observational studies suggest that physical exercise positively affects maintenance of weight loss after a diet intervention; however this is not a consistent finding, though non-randomized weight loss prospective studies revealed that individuals who do not exercise gain more weight than individuals with a high level of physical activity. Moreover, studies assessing the effect of physical activity on maintaining body weight showed that the exercise group(s) gained less weight compared with the control group (reviewed in [2]).

Overall, exercise can be a very effective strategy for weight loss maintenance for those individuals who are able to maintain a regular exercise regimen. Moreover, clinicians should emphasize that a significant weight loss is not possible to occur from a physical exercise program if the overall volume of exercise and caloric restriction is not well above the minimum recommended levels. In addition, they should encourage participants to adhere to long-term exercise training programs [2,17,19].

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