STUDIA UBB EDUCATIO ARTIS GYMN., LXV, 3, 2020, pp. 77 - 86
(RECOMMENDED CITATION)
DOI:10.24193/subbeag.65(3).23

IMPACT OF PHYSICAL ACTIVITY ON OBESITY IN ADULTS

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ABSTRACT. The significant increase of the prevalence of overweight and obese adults raises the importance of approaching this major issue of public health. Our modern life style characterized by the intake of highly caloric food and low levels of physical activity, accompanied by long periods of sitting and a poor sleep interacts with our basic biology creating an environment where the circadian rhythms are disrupted which more often result in a higher number of metabolic disorders. The excess of body weight is associated with many negative effects upon health including but not limited to cardiovascular diseases, diabetes, some form of cancers and muscle and bone disorders. Since the physical activity is more and more performed in organized environment, the importance of physical activity in the society increased in time, not only for the individual but for the public health. Our daily life becomes less and less physically active, while organized physical training increases. The average caloric intake is increasing, which means more unconsumed energy and as a result more overweight persons with health problems. Physical training seems to be an important factor in approaching this epidemic of obesity. This paperwork aims to revise the literature to determine if the physical activity can be associated with the prevention of weight gaining in obese adults.

Keywords: *physical activity, obesity, overweight.*

REZUMAT. ***Impactul activității fizice asupra obezității la adulți.*** Creșterea semnificativă a prevalenței excesului de greutate și obezitate a crescut importanța abordării acestei probleme semnificative de sănătate publică. Stilul nostru de viață modern predominant care încorporează accesul continuu la alimente cu densitate energetică și niveluri scăzute de activitate fizică obișnuită, însoțite de perioade de ședință prelungită și calitate/cantitate inadecvată de somn interacționează cu biologia de bază pentru a crea un mediu în care ritmurile circadiene sunt perturbate, ducând adesea la o multitudine de afecțiuni metabolice. Greutatea corporală excesivă este asociată cu numeroase rezultate negative asupra sănătății care includ, dar nu se limitează la boli cardiovasculare, diabet, unele forme de cancer și afecțiuni musculo-scheletice. Deoarece activitatea fizică se desfășoară tot mai

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mult în mod organizat, rolul activităţii fizice în societate a devenit din ce în ce mai important de-a lungul anilor, nu numai pentru individ, ci și pentru sănătatea publică. Se discută că viaţa noastră de zi cu zi devine din ce în ce mai puțin activă fizic, în timp ce exerciţiile și antrenamentele organizate cresc. Aportul mediu de energie este în creștere, creând un surplus de energie și, astfel, vedem un număr din ce în ce mai mare de persoane supraponderale, ceea ce contribuie puternic la problemele de sănătate. Exercițiul fizic pare a fi un factor important pentru abordarea epidemiei de obezitate. În lucrarea de faţă se realizează o revizuire a literaturii de specialitate pentru a determina dacă activitatea fizică este asociată cu prevenirea creșterii în greutate la adulţii obezi.

Cuvinte-cheie: *activitate fizică, obezitate, supraponderalitate.*

Introduction

The significant increase of the prevalence of overweight and obese adults raises the importance of approaching this major issue of public health. Physical training seems to be an important factor in approaching this epidemic of obesity.

Physical exercise can represent a major component in weight loss and therefore, it is usually included into the weight management program. However, the effects of exercise on weight loss and change of body composition are minimal in short-term treatment programs (<6 months), compared to the effect of reduction of caloric intake.

The 2008 Report of Physical Activity Guidelines Advisory Committee (PAGAC), states that physical activity has been associated with a modest weight loss of approximately ≤3 kg, but the prevention of the weight gain as a result of reduction of overall and local adipose tissue mass prevents the risk of diseases (US Department of Health and Human Services, 2009). Moreover, the professional organizations have also identified physical activity as an important habit that contributes to the body weight regulation (Donnelly J.E., et al., 2009).

In addition, Jakicic and collaborators (Jakicic, J.M., et al., 1999) showed that participation in physical training programs is associated with long-term weight loss, and more physical exercises lead to greater weight loss. Although the physical exercises can help maintain long-term weight loss, we cannot say that physical exercises alone are enough to maintain weight loss. It has been shown that maintaining changes in both diet and reaction to physical effort is highly important for improving the long-term weight loss (Jakicic, J.M., et al., 2002).

Revision of Literature

Effects of Physical Activity on Health

The human body requires a certain amount of physical activity in order to maintain health and well-being. Nowadays people need more or less the same amount of physical activity as they did 40 000 years ago (Leonard W.R., 2010). For a regular person weighting 70 kg, this represents approximately 19 km walking each day, in addition to daily physical activity. The amount of physical activity decreases for most of the people while the planning, organized physical exercise and physical training increase.

Unfortunately, the caloric intake also increases, exceeding the daily energy consumption, which leads to calorie surplus. This is the reason for a higher number of overweight persons and one of the main causes of health issues. (Church T.S., 2011). A more sedentary life that does not reach the recommended level of physical activity, together with a high caloric intake, has effect on both physical and psychical capacity and increases the risk of diseases. Despite this, the Swedes (for instance) seem to be physically active and stressed as before, however their overall health is better in 2015, comparing with 2004. In 2012-2015 the Swedes had a better overall health and less tiredness at the same level of physical activity (~ 65% reported at least 30 minutes daily) and stress (~ 13% were stressed) than they had in 2004-2007 (SCB, 2004).

When describing the relationship between the physical activity and certain diseases, we take into consideration the relationship between the measure of effect, risk reduction as presented in studies and the duration of recommended physical activity (Borde R., et al., 2015). The individuals who change their life style from a complete sedentary life to a moderate active life reported the greatest health benefits, and the effects on health were noticed before the measurable improvements of physical performance. In the previous period, most of scientific studies collected data related only to the aerobic physical activity. However, the physical strength exercise shows promising effects on (psychical and physical) health and influence on combating diseases (Northey J.M., et al., 2018; Yamamoto S., et al., 2016).

Aerobic activity helps in weight maintaining after the initial weight loss, reduces the risk of metabolic syndrome, regulates the lipids in blood and improves the quality of life of cancer patients (Geneen L.J., et al, 2016).

It has been proved that resistance exercises as opposed to aerobic exercises, is the best measure to fight against muscular atrophy (Csapo R., et al., 2016), risk of balance loss (Tofthagen C., 2012) and osteoporosis (Cadore E.L., et al., 2014) in elderly. Strength training also prevents obesity (Garcia-Hermoso A.,

et al., 2018), and if made along with aerobic exercises improves the cognitive performance (Groot C., et al., 2016), has an important role in preventing neurodegenerative diseases (Chung C.L., et al., 2016) and improves the bone density (Ciolac E.G., et al., 2016; Castrogiovanni P., et al., 2016). The risk of accidents increases with aging due to the loss of muscle mass, of coordination and balance (Cho S.I., et. al., 2014). Physical activity counselling for muscle strengthening in addition to the aerobic activity it is highly recommended for improving the overall health.

Besides helping with the weight loss, physical exercises provide other important benefits for health. (Wei, M., et al., 1999). For instance, higher level of cardiorespiratory fitness is associated with a lower mortality due to cardiovascular diseases, while overweight adults with the highest level of fitness may have a lower risk of cardiovascular diseases than physically unfit adults of normal weight. This may be the result of exercise which decreases the risk factors for cardiovascular diseases (i.e. arterial hypertension, diabetes etc.), regardless of the changes in body weight. Therefore, even the individuals who have difficulties in losing weight can benefit from regular sessions of physical exercises if the volume and the intensity of the exercises are adequate for generating these health benefits.

Brown and collaborators (2016) mention a study regarding the relationship between physical activity and chances of maintaining a healthy body weight (which is IMC ≥18.5 up to <25 kg m − 2). Comparing with less than 0.7 MET h week − 1, the probability rate for maintaining a normal IMC was 1.18 (IC 95%, 1.00–1.40) for 0.7 to less than 8.3 MET h week − 1, 1.23 (95% CI, 1.03-1.47) for 8.3 to less than 16.7 MET h week −1 and 1.44 (IC 95%, 1.20–1.72) for 16.7 or more MET-h week-1 − 1 (Brown WJ. Et al., 2016).

Considerations Regarding the Distribution of Physical Exercises for Overweight Persons

Until recently, the public health recommendations of physical exercises and activities consisted of minimum 30 minutes of moderate intensity activity performed almost every day of the week (U.S. Department of Health and Human Services, 1996). However, more recently the Institute of Medicine suggested that 60 minutes of physical exercises may be needed for weight control, and this recommendation is almost double comparing with the previously recommended activity (Institute of Medicine of the National Academies, 2002).

In spite of limited research that evaluates the effect on weight loss of 30 de minutes of physical exercise, comparing with 60 minutes of physical exercise, the available evidence seems to support the recommendation of 60 minutes of physical exercise for long-term weight improvement (Jakicic, J.M., et al., 1999;

Klem, M.L., et al., 1997). Data of the Weight Control National Register revealed that the individuals who maintained an average weight loss of 30.0 ± 15.5 kg during approximately 5.5 years, also had a weekly average energy expenditure of 2,500 kcal with physical activities during leisure time (Klem, M.L., et al., 1997), which represents almost double of the minimum quantity recommended by public health authority (U.S. Department of Health and Human Services, 1996). According to Jakicic and collaborators' report (Jakicic, J.M., et al., 1999), the greatest weight loss was associated with a physical activity of at least 280 minutes weekly during 18 months, which is again, double than the minimum amount recommended by the public health authorities.

The studies which revealed a significant inverse correlation between physical activity and weight gain reported data for certain domains of physical activity. This included spare/leisure time, occupational activities, household activities, walking and climbing stairs, and some of the studies also reported the level of intensity of the physical activity (easy, moderate, vigorous, moderate to vigorous).

Total physical activity performed in the leisure time was constantly associated to change in body weight in all analyzed studies (De Munter JS, et al., 2015; MacInnis RJ, et al., 2014). The studies which reported moderate intensity (Drenowatz C, et al., 2016), high intensity (Williams PT., 2007) and moderate to high intensity (Gebel K, et. al., 2014) revealed consistent patterns of inverse correlations with weight gain. However, low intensity physical activity was not associated with the prevention of weight gain. (Drenowatz C, et al., 2016).

Walking has not been constantly associated with change in weight or IMC (Gradidge P., et al., 2015) or with the incidence of obesity occurrence (Rosenberg L. et al., 2013). Notwithstanding the afore said, it has been reported that walking 10,000 steps or more daily, diminished the weight gain, comparing with walking less than 10,000 steps daily. These results may suggest that in order to diminish the weight gain, a high number of (walking) steps daily is necessary.

The studies evaluated the professional and household activity, as well. Moderate to vigorous professional activity was inversely correlated with the weight gain. However, this inverse correlation was not valid for low professional activity (Adair LS., et al., 2011). In the studies regarding the household activities, no evidence was found to support that this type of physical activity reduces the weight gain. (Drenowatz C., et al., 2016).

Strategies for Choosing and Maintaining the Physical Exercises in Case of Overweight Persons

Although it is highly important to understand the level of exercise that leads to the greatest long-term weight loss, it is also important to understand the factors that do not allow choosing and maintaining certain physical exercises

for overweight adults. There are many impediments against physical exercise. The attendance to physical exercise increases as these impediments are reduced and this may lead to the reduction of body weight. Some of the most important impediments which might influence choosing and maintaining physical exercise are environmental factors that influence the convenience of exercise and factors which might influence the lack of time for performing physical exercises.

Manipulation of the environment in which a person activates (i.e. home, workplace, neighbourhood etc.) for changing the behavior related to physical training, might help to create more suitable opportunities for physical exercises that might increase the attendance to physical activity. One example of environment manipulation which is frequently used by people consists in putting fitness equipment in homes. One transversal study revealed that the volume of physical exercises and home fitness equipment was significantly associated with the levels of physical activity performed in the spare time (Jakicic, J.M., et al., 1997).

The lack of time was also identified as an impediment for overweight people to perform physical exercises and to include them in their lifestyle. For sedentary adults, one strategy to overcome this impediment would be focusing on physical activities performed during the whole day rather than physical exercises performed during one continuous session (30 to 40 minutes/session). The efficiency of encouraging the performance of physical exercises in 3-4 sessions of training of at least 10 minutes was studied in relation with the attendance to physical training and weight loss on overweight women (Jakicic, J.M., et al., 1995). The results of this study showed that this strategy can be efficient for increasing the initial rate of attendance to 6 months' plan of physical exercises in case of previous sedentary adults.

Impact of Obesity on Public Health

Weight gain leading to excess weight or obesity is associated with an increased risk of occurrence of many chronical diseases. This represents an important concern for health in many developed countries due to a high prevalence both of excess weight and obesity. Thus, although it is important to focus ourselves on treatments that works for excess weight and obesity, the implementation of efficient strategies of public health is also necessary in order to prevent approximately 0.5-1 kg of yearly weight gain and the onset of excess weight and obesity in adults. (Dutton G.R., Kim Y., Jacobs D.R. Jr, et al., 2016). The scientific evidence supports the idea that the physical activity can represent an efficient behavior included in the lifestyle, in order to prevent or minimize weight gain in adults. Therefore, the public health initiatives for preventing the weight gain, excess weight and obesity should include physical activity as a lifestyle.

Conclusions

In many countries, obesity represents a major public health issue. Physical exercises should be included as a major component of any intervention for weight loss. Although the physical exercises may have a modest impact on short-term weight loss, physical exercises can be highly efficient for long-term weight loss and for prevention of the weight gain. Moreover, the quantity of physical exercises required to facilitate the long-term weight loss can be higher than necessary in order to obtain significant health benefits, but this idea requires further investigations. When recommending physical exercises for overweight adults, it is highly important to consider the assessment strategies, the indications for training plan and interventions which might affect the attendance to and maintenance of physical exercises programs.

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