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Comprehensive Physiotherapy for Obesity Treatment

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Abstract – Obesity is regarded as the worst health issue in the world by the World Health Organization today. This applies not just to young people but also to adults. Obesity leads to increased sickness, disability, death and a decreased society's quality of life. Higher risk of mortality from cardiovascular disease and several cancer disorders is also attributed to fat. About 40% of persons worldwide now are overexposed and 13% obese. In Poland, same trends were also seen. Comprehensive therapies include food therapy, nutrition training, changes in behaviours, increased physical activity, pharmaceutical therapy and surgical operations. A negative energy balance is the cornerstone for obesity therapy. Typically, this status is attained via food measures and increased consumption. Appropriate therapy programmes are essential to the success of obese patients' slimming. Mass reduction programmes, which take into account four components of the physical activity: frequency, intensity, duration and kind of physical activity are individually constructed using the FITT formula. Physiotherapists have a crucial role to play in this process. Individual therapy programmes, with regard to coexisted disorders, assist to adapt all elements of training to the health condition of obese patients.

Keywords – Obesity; Treatment; Physiotherapy; Physical Activity

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1. INTRODUCTION

Obesity is a chronic condition defined by an increase in fatty tissue content in the human body of more than 25% in males and more than 30% in women (Zahorska-Markiewicz 2005). The World Health Organization (WHO) stressed in its 2000 report that obesity is not only the adult health, but also children and adolescents as the most significant health conditions.

Body Mass Index (BMI) dividing body weight (kg) by squared body height (m2) is the most prevalent measure of overweight and obesity. BMI standards are between 18,5 and 24,9 kg/m2, and overweight diagnoses are made with BMI = 25-29,9 kg /m2 for adults, and obesity with BMI of 30 kg /m2 according to WHO classification (2000) Obesity is 3 levels: 31–34.9 kg/m2 BMI (first grade), 35–39.9 kg/m2 (second grade) and 40 kg/m2 BMI (third grade), later called pathological oesity. Obesity is 3 grades of obesity. The use of BMI entails a mistake, since the mass of the body is measured without considering the composition of the body. Muscle tissue is heavier than adipose tissue therefore, while it is modest in body fat, BMI is high in those with well-developed muscles. People with appropriate physical development and increasing belly fat are also present (Ruderman 1981, 1998).

It is important for a diagnosis of obesity to examine body composition, according to Zahorska-Markiewicz (2005). Bioelectric impedance analysis (BIA) is in practise the most often utilised approach (analysers: Bodystat, Omron, Maltron, Tanita). Although a study published by Kyle et al. (2004) challenged the use of this diagnostic method for diagnosing obese people, many studies showed that the analysis of the composition of the body of healthy people and diabetes, blood pressure, obesities and other conditions in BIA represents a reliable, non-invasive, safe and effective method (Kotler et al. 1985, Segal et al. 1985, Lewitt et al. 2007, Heyward & Wagner 2004).

The causes of obesity are complicated and numerous elements describe them (Yanovski & Yanovski 2002, Haslam & James 2005). Whatever the root aetiology of the condition, obesity is accompanied with chronic energy balance abnormalities associated with over-consumption of energy (food) compared with human physiological requirements (Zahorska-Markiewicz 2002, 2005, Czech & Bernas 2007).

In the previous 30 years, a rapid growth in obesity was mainly due to cultural and environmental causes. The development of obesity involves high calories, big diets, poor levels of physical activity, sedentary lives and food disorders (Branca et al. 2007, James 2008). The result of new civilizations and technological improvements is that sedentary lives spend much of the time passively. The second

significant component in overweight and obesity pathogens is diets of modern humans.

The analysis of the modern diet components showed large fat rise (40-45% versus 15-20%), increased monocharide intake and decreased carbohydrate, fibre and mineral consumption (Konner & Eaton 2010). Many of contemporary people's nutritious errors stem from inadequate knowledge of a healthy diet (early introduction of artificial feeding, imbalanced diets, irregular foods and large-scale intervals between meals, often snaking among foods), access to processed food, little time for food preparations, food producers' marketing activities (advertising), inadequate spening (Komender 1985, Radoszewska 1996).

A side effect of obesity is the organic hypothalamic diseases (tumours, inflammation), genetic syndromes (Turner's Syndrome, Clinical syndrome, Prader-Willi syndrome, Dercum disease), drugs (antidepresents, tranquillizers, block steroids), antidiabetes. Obesity is a secondary feature, with 10 percent attributable to endocrine disorders (hypothiroids, Cushing's Syndrome, PCOS, growth hormone deficiency, Hypogonadism) (Zahorska-Markiewicz 2002, 2005).

2. WEIGHT MANAGEMENT

In the prevention and treatment of obesity physiotherapists have a role to play. Obesity leads to movement constraints that limit physical activity.

The core to the field of physiotherapy practise is exercise and mobility. In addition to a comprehensive, patient-oriented approach to issue solution, physiotherapists have superior knowledge and capabilities

- anatomical, physiological, and psychosocial mechanisms of health and disease
- assessment and diagnosis
- behaviour change
- biomechanics
- exercise prescription and therapeutic exercise
- management of long-term conditions.

Physical and psychological difficulties are therefore perfect for dealing with obesity. Physiotherapists In multidisciplinary obesity care, physiotherapists contribute essential input and expertise in helping to maximise clinical results and patient experience.

Although the benefit of physical activity is generally recognised, it frequently makes it difficult for patients to do so in reality. Patients should be helped to increase physical activity at the correct level, which may be done by reference to a physical therapist. A physiotherapist evaluation and treatment plan can assist you overcome exercise obstacles.

An obese patient treatment strategy may include:

- personalised advise on the lifestyle, taking account of attitudes, beliefs, circumstances, cultural and social preferences and willingness to change.
- Prescription, monitoring and advance of proper physical activity in order to build muscular strength, flexibility and endurance, and maintain power production in order to improve and maintain weight reduction under safe and regulated circumstances
- Management of related disorders such as arthritis, back pain and other chronic and musculoskeletal disorders, such as cardiac illness.
- coordination in partnership with service users, other health and social care experts and the local community services of comprehensive and sustainable management plans.

3. CHILDREN AND YOUNG PEOPLE

Obesity children, like adult children, typically have a multitude of indications and symptoms of musculoskeletal activity that may restrict physical exercise.

Being fat is damaging to high motor power, as in coordination, balance, running speed, agility and strength, for example, of the upper and lower limbs. These discrepancies grow increasing with older children, indicating that early attention on developing motor skills could promote excessive weight and obesity.

Physiotherapy-led workouts and multi-disciplinary team operations with inputs from physiotherapy improve the motor skills, level of activity, IMB and other anthropometry considerably among youngsters.

4. FACTORS OF OBESITY

- **Pregnancy:** During pregnancy, weight increase is usual. Some women find it hard to shed weight after birth. This increase in weight may lead to obesity in women. The greatest way to reduce weight during pregnancy may be via breast-feeding.
- **Quitting smoking:** Quitting smoking is commonly linked to gaining weight. And it may lead to sufficient weight gain for some to qualify as obesity. This often occurs when individuals use food to handle the withdrawal from smoking. However, stopping smoking will continue to be a bigger benefit to your health in the long term than smoking. After you stop smoking, your doctor can assist avoid weight gain.

- **Lack of sleep:** Not getting enough sleep or sleep too much might lead to hormone changes that boost your hunger. Also, meals that might contribute to gaining weight might be heavy in calories and carbs.

- **Stress:** Many environmental variables affecting your well-being and mood might lead to obesity. When you face stressful conditions, people frequently go for more high calory meals.

- **Microbiome:** Your intestinal flora are impacted by what you consume and may help increase weight or lose weight.

- **Previous attempts to lose weight:** Another weight increase may be caused by previous efforts at weight reduction followed by quick weight recovery. This phenomenon may lower your metabolism, commonly dubbed yo-yo diet.

5. COMPLICATIONS

Obesity patients are more susceptible to many possible major health concerns, including:

- **Heart disease and strokes:** Abnormal blood pressure and cholsterol levels are more likely to cause you obesity and risk heart disease and heart disease.

- **Type 2 diabetes:** The utilisation of insulin in the blood sugar level by your body is influenced by obesity. This increases your risk of diabetes and insulin resistance.

- **Certain cancers:** The risk of uterine, cervical, endometrial, ovarian, breast, colone, rectum, oesophagus, liver, gallbladder, pancreas, the kidney, and prostate might rise if your body is obese.

- **Digestive problems:** The probability of heartburn, gallbladder disease, and liver disorders is increased by obesity.

- **Gynecological and sexual problems:** Obesity in women may cause infertility and irregular periods. Obesity may lead to erectile dystrophy in males as well.

- **Sleep apnea:** Obesity is more susceptible to sleep apnea, a potentially severe condition in which respiration pauses and begins frequently throughout sleep.

- **Osteoarthritis:** Adipose raises the load on heavy joints, as well as stimulates inflammation in the body. These variables may cause consequences like arthritis.

6. EPIDEMIOLOGY AND HEALTH CONSEQUENCES OF OBESITY

The research released in 2015 by the WHO shows that 40% (5-76%) of persons with overweight are overweight and 13% are obese. The most prevalent in North American and South American nations, Europe as well as Africa, Asia and Australia are overweight and obesity. The largest proportion of obese persons in the United States (39 percent). In almost 3% of males and 7% of females across the globe, morbid obesity exists. More than 50% of the population of European nations is overweight and 30% is obese. Albania, Greece and Croatia have the greatest level of this issue. France, Sweden, Denmark and Norway are the nations with the lowest overweight and obesity figures (Tsigos et al. 2009). In Poland, too, there is a high rate of overweight and obesity. The study carried out by the Polish Institute for food and nutrition (2000) showed that 41% of men and 28.7% of women were overweight, whereas 15.7% were males and 19.9% of women who were overweight (Jarosz 2006, Szponar et al. 2003). The prevalence of overweight in males was assessed at 40.4% in 2003-2005 by a study published byWOBASZ (2005) among persons aged 20-74 years and 27.9 percent in women. Approximately 21.2% of males and 22.4% of women have obesity. Moreover, in 34% of people (39% of males and 29 percent of women), the NATPOL survey identified overweight and obesity in 19%. (Zdrojewski et al. 2002). Like other nations, increased trends for prevalence of overweight and obesity have been documented. The survey's findings also demonstrate that Poland is one of Europe's leading nations with the domination of abdominal obesity in the IDEA (International Day for the Evolution of Abdomen Obesity). The kind of obesity affects 54% of women and 38% of men in Poland (Balkau et al. 2007) and has a positive correlation with cardiovascular and metabolic illnesses (Zhu et al. 2002, Balkau et al. 2007).

Obesity is a primary cause of increased illness, discapacity, death rates and worse living quality in society according to Banegas et al. (2003). Many studies have shown that obesity increases the chance of mortality, both owing to cardiovascular illnesses and certain malignancies, particularly among those with high obesity rates (Adams et al. 2006, Flegal et al. 2007, Renehan et al. 2008, Stevens et al. 2002, Roberts et al. 2003, Linde et al. 2004). There are a number of obesity-related complications listed by a group of European Obesity Experts (Tsigos et al. 2009): metabolist (diabetes, resistance to insulin, dyslipidemia, metabolic syndrome, hyperuricemia, gout), cardiovascular (arterial hypertension, ischeme, circulatory collapsing, strokes, venous thrombosis) disruptions of the body (asthma, hypoxia) (low self- esteem, fears, depression, exclusion, discrimination in employment, environmental acceptance and salaries). Higher risk to health reflects increasing health system needs.

The cost of direct obesity in Europe is estimated in excess of 7% of the overall health care expenses equivalent to cancer expenditures (Branca et al. 2007).

7. TREATMENT: PHYSIOTHERAPY

The primary objective of obesity therapy is to guarantee a decrease in body weight in order to reduce the health risks and to preserve healthy body weight. Obesity treatment seeks to reduce body weight by around 5 to 15% during a 6-month period of beginning weight (Porier et al. 2006) and 20% decrease in BMI patients over 35 months. Reducing food energy consumption (limiting calorie intakes with food) and/or increasing energy spending by means of the muscle labour produce a negative energy balance (physical activity). Increased thermal bacteria may also reduce weight (Zahorska-Markiewicz 2002, Salvador et al. 2002, Bray & Tartaglia 2000, Deters 1990). Slimming treatment is a long-term procedure and a variety of professionals need to cooperate. Diät therapy, nutrition education, behaviours modifying, increasing levels of physical activity and pharmaceutical therapies are specific components of all slimming therapies (Pupek-Musialik 2006, Bray & Tartaglia 2000, Zahorska-Markiewicz 2002). Obesity may potentially be treated with surgery (Stanowski & Paśnik 2008).

Physiotherapy plays a significant role and if well planned and paired with adequate diets is a key to success in the entire approach to the management of obesity reported in this research.

A research by Wing (1999) has shown that obesity therapy combines low-calorie meals and increasing amounts of physical exercise most effectively. These findings corresponded to previous writers' findings (Zając & Waśkiewicz 2001). Diet alone reduces body weight, but causes both adipose and muscular tissue to be lost. The decrease in metabolism rate is a highly disadvantageous condition noticed on low calorie diets alone (20- 30%) (Benedict et al. 1915, 1919, Krotkiewski 1994). On the other hand, physical exercise alone does not include such risks, but is extremely difficult for obesity patients and as shown in the research, it leads more frequently to positive body composition changes than than a loss in weight and it may even increase people's weight by increasing their muscle mass. (Cieślińska etc. 2002). (Krotkiewski 2004). Several research have shown that persons who routinely train following a slimming procedure acquire greater treatment effects than those who do not engage in physical activity (Van Dale et al. 1990, Holden et al. 1992, Svendsen et al. 1994, De Pue et al. 1995, Hensrud et al. 1995, Saris et al. 2004).

Further health advantages for obese people engaging in physical exercise may be widespread (Zahorska - Markiewicz 2000, Van Baak and Saris 1999, Brwnelle and Wadden 1999. Jakicic 2003, Ross et al. 2004.

- increased energy expenditure and accelerated body weight reduction,
- reduced abdominal fat,
- increase in fat free mass (muscles and bones)
- reduction in undesired diet-induced energy expenditure at rest,
- lower insulin levels, improvedglucose tolerance and lipid profile,
- lower blood pressure and heart rate at rest and during exercise,
- improved physical fitness,
- reduction of lower limb and spinal pains,
- long-term following a dietary regimen,

Enhanced health and mood, In order to treat obese physical exercise effectively, several parameters must be satisfied. Physical activity should have a general fitness aerobic exercise, both in the area of preventive and slimming therapy, which helps us consume adipose-stocked power. This form of activity involves metabolic pathways in which fatty acids, in particular, may be fully utilised. Unlimited availability of oxygen to the muscles employed is a prerequisite for this procedure. Aerobic practise is characterised by medium and low intensities, effective use of oxygen by working muscles (in addition, cardiac muscles), involvement of major muscle groups that continue to work throughout exercise and cycling, and the chance to make effort without interruption, characteristics of resistance or endurance conditioning according to Van Baak & Saris (1999) and Brownell & Wadden (1999). Body weight reduction trainings, which should be prepared attentively, according to the physical capacitance of the patient, and continuous monitoring and modification, are based on aerobic workouts. In addition, patients should be recommended to enhance their physical daily activities such as walking, ascending steps in place of elevators, hand washing cars, manual changing TV stations, instead of using remote control (Zahorska-Markiewicz 2002).

8. INTENSITY

For those without cardiovascular issues, the intensity of recommended exercise is generally decided by heart rate (HR). HRmax = 220 - age is the most frequent HRmax cardiac rate measurement formula. For determining the heart rate zones for exercises the value generated from this algorithm is used. According to Coyle (1995), fat burning mechanisms seen during physical exercise occur at a heart rate of 70 to 75% of HRmax. Most studies indicate the cardiac training rate for obese adults to be between 60% and 70% (Van Baak & Saris 1999, Brownell & Wadden 1999).

The extra fat elimination involves both less rigorous and greater intensity aerobic activity. The latter helps to streamline mitochondrial structures in the muscles which might lead to the more intense burning process (Zajìc et al. 2010). The latter is directly involved in burning acids.

If cardiovascular issues coexist, it is advisable to undertake a training trial before planning training in order to assess a patient's exercise capacity, using the greatest cardiac rates achieved during the heart rate zone test at 60-70 percent of this value (Bromboszcz & Dylewicz 2005).

Another way of measuring the intensity of exercise is to compute the cardiovascular reserve (HRR), where HRR = HRpeak-HRrest, for obese people with concurrent cardiovascular illnesses (HRpeak - peak heart rate measured during the exercise test, HRrest - heart rate at rest). HRR 40-70% is used to determine the level of the exercise by calculating the training zone as described in the formulation: 40-70% [HRpeak - HRrest] + HRrest.

9. TYPE OF EXERCISE

A suggested kind of exercise for patients is a question of the obese person's particular inclination. The general fitness training is characterised by strong walking, alternative walking and running, cycling, bathing and water workouts, aerobics, sports by team (e.g. volleyball) badminton, gymnastics, ski trails, tennis, escalators, dance, and many others. These workouts engage major muscle groups, notably antigravity muscles (extender), which are distinguished by the predominance of slow-twitch fibres (Kubica 1994).

- **Walking:** Walking is without a doubt the most fundamental and accessible anaerobic practise and enables anaerobic exercise to be dosed easily and is adapted to age and tolerance. However, because of the probability of degenerative changes in lower limb joints, it cannot be suggested to all fat individuals. It should be stressed that walking causes calories to be consumed at the same distance comparable to running. The degree of physical activity was recently evaluated using foot pots that take into account a person's daily amount of steps (Plewa 2008). The number of measures advised for reducing body weight is 12,000-15,000 per day (Leermakers et al. 2000).

Nordic walking is growing popular in Europe, which involves quick walking with specific poles. This sort of action is suitable at different physical fitness levels for both men and women. Nordic walking offers enhanced endurance and physical fitness, good posture, reduced weight, increased stability and balance when walking. Most muscles are involved in this sort of action. The muscles function considerably differently from normal walking. The shoulder muscles get more actively engaged and get stronger and can function for a longer period as a consequence of frequent training. Nordic walking helps you burn more calories than usual. It may therefore be seen as a healthy type of weight loss. Skandinavian walking also benefits from enhanced health, increased circulatory power and more bodily oxygen (Strycharska-Gać 2007, Zabłocka 2007).

- **Cycling:** Cycling enhances the functioning of the circulatory system and contributes to the strength of the leg. This kind of exercise is a low-intensity training, provides freedom and guarantees that each training session has a changing setting. Cycling is a sort of sport that loads the body weight onto your cycling bike to prevent severe loads of your ankle, knee and hip joints. Cycle ergometers may also provide aerobic training. This kind of motor activity enables for music, television and physical activity to be combined, regardless of the weather conditions. It also provides heart rate monitoring with in-build sensors, in the same way as other stationary training equipment. There are two versions on the fixed ergometers: set to vertical and reclining positions. Lastly, it is better for persons suffering from lower back and neck discomfort (Peters 2000).

Aerobics or group exercises are another type of physical activity for obese people. Aerobics is a set of exercises involving all muscle groups performed at a rhythm of the music in one session (usually 45-60 minutes). If the exercises are properly selected by a trainer, it is a good way of training obese patients. Dynamic jumping, loading one limb and standing position minimise aerobics for obese people. The fitness level of the members should be changed in line with the training intensity. It is recommended that the exercises be conducted in isolated positions: sitting, lying down, lying on the side, kneeling on all fours, so that the load on the lower limb joints is minimised. Additional accessories such as balls, small weights or elastical bands are an appealing way of enhancing training. This method generally has the nature of a group training which inspires patients to practise regularly and adds to better therapy outcomes.

- **Swimming:** Swimming is a different kind of physical exercise that individuals who need to lose weight might suggest. It is utilised in slimming treatments for general fitness conditioning and has several advantages to avoid motor system problems. The abolition of joint load, which is especially significant for obese patients, is a major advantage of the aquatic environment. Water is also resistant to activity (Piotrowska-Całka 2004). If a patient is able to swim, a specified duration of swimming stroke may be used for aerobics (45-60 minutes). Water (or aqua-aerobics), which involves all muscular groups, may also

be performed by patients. In several places, this sort of programme is employed. Exercise intensity should be adjusted to water temperature during aquatic workouts. For fat persons, the optimal temperature of the water is around 31-32°C. Due to the rapid transfer of heat, lower water temperatures require a greater level of exercise, whereas higher water temperatures deteriorate human bodily heat release, causing lower levels of exercise (Plewa & Markiewicz 2006).

- **Skating:** Skating is comparable to running, but the strain on the joints is significantly smaller. The air and circulatory system. This sort of physical exercise has numerous muscles, including gluteal, lower, and abdominal muscles. This sport might be advised for overweight persons because of joint protection. But, particularly during the early stage of this discipline, the increased risk of injury (compared to running) should be taken into account.

- **Dancing:** Dancing is a highly common type of physical exercise among fat individuals and makes it possible to release energy by using many muscles in a dance. Group lessons are generally scheduled at various levels, however the intensity of the training may always be varied.

- **Cross-country skiing:** Skiing around the nation is a sort of physical exercise practicable in the wintertime. It comprises several muscle groups and helps to consume considerable energy. The low-temperature environment speeds your metabolism. The sport needs to develop a ski cross-country technique and to utilise the pole appropriately. The skiing instructors should be consulted by the new cross-country skiers before beginning training.

Due to a considerable burden on the joints and spinal columns, it is suggested that excessive body weights (BMI>35) start work without any load initially (water exercises, cycling, exercises in low positions or exercises on a ball). The stress onto joint surfaces in lower limbs decreases these types of physical exercise. For fat individuals jumping, quick running, alpine skiing or escalation is not recommended (Plewa 2011).

Each training should take 3 stages into account, irrespective of the sort of physical activity desired by a patient. The first step is to warm up, taking 5 to 15 minutes. The warm-up is designed to prepare the respiratory and circulatory systems for high physical activity, along with the neurological and muscular systems. This period is also important for injury prevention (Kubica 1995). Depression activities to enhance joint mobility and muscular flexibility are prescribed. The workouts must also be vibrant. Then you should carry out the primary fitness workout gently. If a run is used as a workout, warm-up should be done at a slower speed than in the main phase (Brownell & Wadden 1999).

The second phase, the major phase, should take between 20 and 60 minutes. The major workouts were during this stage (walking, cycling, swimming, gymnastics). The objective is to achieve and maintain a certain cardiac training rate in the patient. At the start of the slimming programme, the main stage of the treatment should be shortened and extended for 10 to 20 minutes. The practise closes with a refreshing phase of 5 to 15 minutes. In this phase, although with reduced intensity workouts will be continued from the main phase. This stage is aimed at slowing down the breathing and heart rate and allowing blood to gradually return to the heart, so that the risk of losing consciousness and disturbances in the heart can be eliminated. Static muscular stretching, particularly following strength training, is also helpful after the major section.

10. STRENGTH TRAINING IN TREATMENT OF OBESITY

Strength training plays a vital part in the patient's slimming programme, although resistance training is as vital as aerobic workout for reducing adipose tissue in obese individuals as it has been established in a research by Kussel (1991). First and foremost, this training avoids reductions in skeletal muscle mass for diets and aerobic exercise that may be noticed. It may also induce the development of muscular mass, hence increasing the metabolism. The strengthening of the posture also strengthens the muscles that in obese people are typically quite weak.

For main muscle groups, strength training should include 8 to 10 resistance exercises (lower limbs, gluteal, back, abdominal, shoulder and chest muscles). This may be done utilising body-building techniques, in which each exercise is carried out in sets (sets 3 to 4 advised), with each set of exercises including a single exercise repeated 8 to 20 times. The training may also be employed, all exercises being done 2 to 4 times as one set. The outside resistance of 30 to 50% of maximum muscle strength must be adjusted individually. Multiple repeats of an activity with resistance rather than resistance are the primary focus of slimming treatments. If the patient can overcome the external resistance 12 to 15 times, the load may be considered appropriate. It should take 60 seconds to relax between sets. Forced workouts are advised twice a week as a slimming supplement. It is crucial to manage breathing and exhale during the resistance phase during the tough workout. To prevent a rapid spike in blood pressure, the patients should concentrate on avoiding holding the breath. It is also crucial that appropriate technique be ensured and that assistance be offered from a physiotherapist or coach.

11. CONCLUSIONS

Obesity in children has considerable unfavourable health implications in infancy. The most broad effect of psychological illness in infancy is probable. A significant number of high-quality data showed the existence and clustering of cardiovascular risk factors in the youth is substantially related to childhood obesity.

There are now a number of long-term adverse repercussions of childhood obesity. There is substantial, but minimal, socioeconomic consequence of obesity in adolescence/young adulthood. Obesity is often persistent throughout adulthood in children. In the future, a clear connection between childhood obesity and morbidity/mortality should be shown in increasing cardiovascular morbidity when the present generation of obese children becomes adult. Cardiovascular consequences of obesity continue in children. In conjunction with this proof, stronger measures to prevent and cure childhood obesity are strongly supported.

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