Treatment of Pediatric Obesity

ÇOCUKLUK ÇAĞI OBESİTESİNİN TEDAVİSİ

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Summary

Almost one-third of adult obesity onset in the pediatric ages, and 80 % of obese children eventually become obese adults. In adult obesity may change if obesity is decreased in children and adolescents.

There are essentially three major categories of weight loss strategies used in the current treatment of childhood and adolescent obesity: Caloric restriction, changes in activity and, behavioral modification therapy.

Caloric restriction for weight loss focuses on the basic concept that if energy intake is less than the amount of energy expended.There are two main categories of diet programs: 1.Balanced hypocaloric diet, and 2.More restrictive protein-sparing modified diet. Physical activity is one of the most alterable sources of human energy expenditure. Researchers demonstrated increased treatment compliance in individuals treated with diet and exercise than in those who followed a low caloric diet only. The final category of weight reduction programs consists of behavioral modification. Basic steps of behavioral modification: 1.Self-monitoring, 2.Nutritional education, 3-Change negative self-statements into positive ones, 4-Parental involvement.

Key Words: Obesity, Treatment, Pediatric ages

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Özet

Erişkin yaş grubu obesitelerinin üçte biri çocukluk yaş gruplarında başlar ve obes çocukların da %80'i erişkinliklerinde obes olurlar. Erişkin obesitesinin sıklığı, çocukluk ve adolesan obesitesi azaltılırsa değişebilir.

Çocukluk ve adolesan çağı obesitesinin güncel tedavisinde kiloyu azaltmak için üç temel basamak vardır: Kalori kısıtlaması, aktiviteyi değiştirmek ve davranış modifikasyonları.

Kilo kaybı için kalori kısıtlaması, enerjinin harcanan miktarından daha az alınması temeline dayanır. Diet proğramlarının iki temel basamağı vardır.1. Dengeli az kalorili diet, ve 2. Proteinden zenginleştirilmiş daha kısıtlı bir diet. Fiziksel aktivite, insanda enerjiyi harcayacak en düzenli kaynaklardan birisidir. Araştırıcılar diet ve egzersizle tedavi edilenlerde tedavi şansının yalnızca düşük kalorili dietle takip edilenlere göre arttığını göstermişlerdir. Kilo kaybettirme programlarının son basamağını davranış modifikasyonları oluşturmaktadır. Davranış modifikasyonlarının temel aşamaları: 1.Kendini izleme 2.Beslenme eğitimi 3. Kendi ifadesindeki negatif bir durumu pozitifle değiştirme 4.Ebeveynlerin katılımının sağlanması

Anahtar Kelimeler: Obesite, Tedavi, Çocukluk çağı

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Obesity is the most common chronic disease in the developed countries. Currently, 33% of adults are considered to be obese, and this number appears to be increasing (1).

The definition of obesity differs between the pediatric and adult population. In the adult, obesity is defined as an excess in the amount of body fat, a body weight in excess of 120 percent of the median weight for a given height (2). At BMIs greater than 40, many comorbid conditions arise; this is a condition known as clinically severe obesity (formerly referred to as morbid obesity). Obesity in children is defined as a weight for height above the 90th percentile on the growth charts from the National Center of Health Statistics, or a BMI greater than the 95th percentile for age and sex. In the pediatric population, a weight for height above the 95th percentile and weight in excess of 140% of the median weight for a given height is referred to as hyperobesity (1).

The increasing incidence and prevalence of obesity creates great concern because of the numerous comorbid conditions associated with it. At a recently held expert panel discussion on healthy

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weight, severe obesity was determined to be associated with an increased risk for the development of cardiovascular disease; hypertension; diabetes mellitus; osteoarthritis; osteoporosis; and breast, endometrial, and colon cancers. Thus, physiologically, severe obesity increases a person's risk for certain diseases, all of which can sharply shorten life expectancy and increase rates of mortality (3). It is estimated that obesity is the cause of over 300 000 deaths yearly (1). Clinical studies with both adult and pediatric subjects have suggested that severe obesity can also affect individuals psychologically and socially; decreasing the quality of the life and resulting in a loss of self-respect (4).

Treatment plans aimed at reducing adult obesity are for the most part unsuccessful (3). Less than 5% of adults who lose weight are able to maintain their weight loss at 5 years after treatment, and 62% regain all of the lost weight (1). With such poor treatment success, it is logical then that efforts be aimed at preventing adult obesity from occurring; but how ?

So far there has been little research addressing the question of whether it is possible to prevent adults from gaining excessive body weight over time. Forster et al. studied the prevention of weight gain in adults using a year-long prevention program comprised of four nutrition education sessions, a monthly weight control information newsletter, and an incentive program (5,17). Results showed that those enrolled in the prevention program had lost less than 1 kg in weight, while the weights of those in the control group remained unchanged; indicating that the prevention of adult weight gain may be as difficult as successfully treating adult obesity.

Further evaluation of the statistics sheds light on this seemingly incurable, unpreventable disease of adulthood. Studies indicate that approximately one-third of adult obesity has its onset in the pediatric age range, and 80% of obese children eventually become obese adults (6). Thus, a clearly significant change in adult obesity may occur if obesity is decreased in children and adolescents; a group which has been found by numerous studies to respond well to both treatment and prevention.

The most important step prior to initiating a treatment plan for the obese child or adolescent requires properly ruling out other underlying genetic or endocrine diseases which may manifest as increased weight. Some of the more common endocrine disorders which may cause obesity include Cushing's syndrome (endogenous or exogenous), hypothyroidism, and primary hyperinsulinemia (i.e.. insulinoma or Beckwith-Wiedemann) (7). The common genetic causes include Prader-Willi, Alstrom, and Laurence-Moon-Biedl (7). Even though these conditions are responsible for less than 10% of the obesity seen in children, it is important to rule them out as they may require different types of therapy (1).

Once the alternative causes of obesity have been ruled out, the diagnosis of common pediatric obesity may be applied. Although this type of obesity accounts for over 90% of weight problems in pediatric patients, it is the least understood.

Many recent studies have focused on the role of molecular genetics and potential mutational gene causes of obesity. The best example of this is the recent explosive interest in the ob gene; its gene product, leptin; the db gene; and its gene product, the leptin receptor (8). Initially, molecular scientists working with transgenic mice carrying knock-outs for these genes formulated a model for the relationship between leptin, its receptor, and obesity. It was shown that leptin was secreted from adipose tissue and that it acted on receptors in the hypothalamus to signal the brain as to the level of body fat stores. Further studies, however, led researchers to discover that leptin is only one player amongst an entire east of genes and their protein products which act as stimulating/ inhibiting hormones that communicate through feedback signals to regulate the consumption of food and body-fat levels.

This complex cascade of events at the molecular level manifests physiologically as the energy balance equation: which simply states that the amount of energy stored by the body is equal to the energy of intake minus the energy of expenditure (1). It is important to emphasize that this equation pertains to energy balance, and not necessarily to weight balance. For example, one who matches calories consumed to those which are expended is not necessarily going to remain at a constant weight. The reason for this inequality between energy balance and individual weight is determined by a number of factors, including not only the molecular and genetic processes discussed above, but also to a large extent, the environment and psychosocial issues of the patient. In the text to follow, treatment regimens will be discussed in the context of these various etiologic aspects of obesity.

The goals of weight reduction in the pediatric patient differ from those in the adult patient. In the latter, a reduction of a modest proportion of weight, maintained for an extended period of time, has been shown to be beneficial to the individual. For example, a weight loss of only 10% has been demonstrated in adults to decrease medication requirements, risk factors, and the comorbidities of obesity (1). In the pediatric population, a weight loss resulting in a final weight near that of ideal is more desirable. Children and adolescents who enter and proceed through adulthood with weights near normal are less likely to suffer the comorbidities of adult obesity described above.

There are essentially three major categories of weight loss strategies used in the current treatment of childhood and adolescent obesity. Two of these are focused on the basic processes which may have resulted in the pathologic weight gain of the individual: calory restriction and changes in activity. The third category, behavioral modification therapy, consists of a collection of programs which focus on the psychosocial issues of weight gain and obesity.

The physiologic basis for caloric restriction as a program for weight loss focuses on the basic concept that if energy intake is less than the amount of energy expended, one will lose weight. One pound of body weight represents about 3500 Calories; thus decreasing daily intake to 500 Calories less than that required to balance the enrgy of expenditure, a weight loss of approximately one pound per week may be achieved (7). There are two main categories of diet programs: (1) balanced hypocaloric diets, and (2) more restrictive protein-sparing modified fasts (1).

The former is the more commonly used type of diet because it is less extreme. It usually consists of gradually decreasing the number of calories consumed per day until a final goal of approximately 1200 calories per day is achieved, which translates to weight loss of approximately 0.5-0.6 kg/week (9). The diet is usually low in fat (25-30%), high in complex carbohydrates (50-55%), and sufficient in protein (20-25%) (1). Implementation of the diet requires an understanding of portion size and allowable food exchanges. For example, the child or adolescent must understand that 2 tablespoons of peanut butter are approximately equal in calories to one egg or a single ounce of lean meat.

The protein-sparing, modified fast (PSMF) was initially used as a very low-caloric diet in the treatment of adult obesity. This diet was studied in adolescents by Merritt and coworkers, Pencharz and coworkers, Dietz and Schoeller, and Brown and coworkers (10). Although these investigators admitted subjects to the hospital for close control, more recent studies indicate that the PSMF is safe and feasible for administration on an outpatient basis (10). As the name indicates, this diet is one in which all calories except those from protein are tightly restricted. The amount of calories from protein is calculated as 1.5-2.0 g of high-biological-quality protein per kilogram of the individual's ideal body weight (see above for IBW calculation). The diet ends up as approximately 50% protein, 40% fat, and 10% carbohydrate, with a total of 600-800 Calories per day.

The main difference between these two diet regimens, other than the obvious caloric variation, is the indication for use. The hypocaloric diet, which achieves gradual weight loss is the regimen of choice in most cases. The later, more restrictive protein-sparing diet is reserved for use in more severe cases of obesity. In spite of significant weight losses of up to 2 kg/ wk, this diet has been reported to be associated with nitrogen loss, orthostatic hypotension, cardiac arrhythmias, impaired growth, hair loss, and gallstones (1). Thus, patients following the PSMF need to be monitored regularly by the administering health-care provider.

Referring again to the equation of energy balance, we find that a second means of reducing the amount of energy stored is by increasing the amount expended. Major sources of human energy expenditure are catabolic processes of metabolism, intrinsic heat generation, and physical activity. As stated above, the former two processes are largely determined by one's genetic composition and interplay between hormones and their receptors within the body. In contrast, one of the most alterable sources of human energy expenditure is physical activity.

In 1985, Epstein et al. Reported that obese children who were treated with a low caloric diet and a supervised exercise program had a greater decrease of percent overweight than children treated with diet only (11). Further corroboration of these data came from subsequent studies, such as that conducted by Reybrouck et al., who demonstrated

similar results, but with an unsupervised exercise program combined with a low caloric diet (11). In addition, this group of researchers demonstrated increased treatment compliance in individuals treated with diet and exercise than in those who followed a low caloric diet only.

It is favorable option to implement a vigorous, regular exercise schedule into the treatment regimen for obesity, however, it is not always likely to be effective due to the difficulty of complying with such tiring, time-requiring efforts. An appealing option which requires seemingly less effort towards compliance on the part of the patient is reduction of inactivity. This translates to simply decreasing the amount of time an individual spends on sedentary activities. Such programs promote decreased time spent watching television and playing computer games, walking up stairs instead of taking elevators, walking to perform household tasks instead of asking someone else to do it, and playing outside instead of inside (1). Studies indicate that these programs may lead to more net activity than a vigorous exercise prescription, with a subsequent increase in energy expenditure and resultant weight loss.

The final category of weight reduction programs consists of those which focus on behavioral modification. Changes in behavior are geared at making the previous two methods of weight loss-reduced caloric intake and increased energy expenditure-more likely to succeed both in the short and long terms. One of the basic steps of behavior modification is self-monitoring. Children and adolescents are taught how to keep track of the times, types, and amounts of the food they consume and physical activity in which they engage. Bandini et al. have shown self-monitoring to be quantitatively inaccurate, but qualitatively useful (12). Information obtained from dietary logs helps to increase awareness as to the actual amounts of food being eaten, problem periods during the day, and patterns of overeating (13).

A second step of behavioral modification is nutritional education. As mentioned above, the hypocaloric diet depends on a thorough understanding of calories and food exchanges by both the child or adolescent being treated and the parent. The most concise, organized means of conveying this plethora of information to the pediatric patient may be via the food pyramid. This easy to follow graphic representation of daily caloric requirements, if used correctly, can aid the patient in understanding food exchanges, proper portion sizes, caloric density of different categories of food, and which spesific foods fall under these categorizations. A second useful method for obtaining similar information about foods is by reading food labels found on most food products today. By combining information obtained from food labels, and the guidelines for appropriate proportions of different food groups displayed on the food pyramid, the well educated pediatric patient can regulate the amount of food he/she eats.

A number of other behavioral modification steps useful in the treatment of childhood and adolescent obesity exist. For example, patients can be helped to change negative self-statements into positive ones. They can also be instructed to change eating behavior, such as taking smaller bites of food, putting down the fork between bites, chewing food longer and leaving food on the plate at the end of the meal (7).

A final step of behavior modification worth mentioning here is the importance of parental involvement. A number of studies have shown that parental involvement significantly improves the outcome of not only behavioral modification therapy, but all types of weight reduction programs discussed above (1).

A few other types of pediatric obesity treatment are available. When diet, exercise, and behavior modification therapies have failed, and if the patient is severely obese, surgery may be considered as a potential procedure to facilitate the loss of excessive weight. For over two decades, operations for severe obesity have been devised, practiced, modified, and in some cases, abandoned (14). Currently, the two most commonly used procedures used for treatment of severe obesity involve gastric partitioning, referred to as gastroplasty, and the gastric bypass (15). Another method of treating obesity is through the use of pharmacologic agents. In 1994, this form of treatment received a great deal of attention with the discovery of the ob gene and its protein product, leptin (see above). It was initially thought that leptin was the magic bullet in the pharmacologic treatment of America's most common chronic disease-obesity. Further studies with leptin, however, revealed that it wasnot the sole cure, but just another hormone in the ever so complex pathway of body fat regulation (16). A number

of other drugs have been released onto the market since then, some of which have even been abandoned due to harmful side-effets (i.e. fenfluramine). To date, no 'magic bullet' for the pharmacologic treatment of obesity exists.

There are a number of different approaches to treating pediatric obesity, but which one is the most effective? A number of studies indicate that a multidisiplinary approach may be the best (10,18,19). Such regimens combine hypocaloric or restrictive protein-sparing diets, an exercise program, and intensive behavior modification therapy. These studies indicate that a multidisciplinary approach can result in weight loss for most obese children and adolescents, but few have achieved an outstanding, long-term weight loss. Many of these multidisciplinary programs require a great deal of cooperation from both the patient and the patient's family, in addition to patience, time, and money. Perhaps the most important aspect to consider at this point is maximizing compliance. This, however, is clearly not an easy goal. It is the author opinion that future studies focus on maximizing compliance by restructuring the goals of weight loss programs. Many of the current studies seek to decrease weight in relatively short periods of time. Seeing pounds drop off the scale gives the patient incentive to continue following the weight loss regimen, but often times the conditions under which this weight is being shed are too difficult to maintain for extended periods of time. For this reason, weight loss regimens should vary the intensity of diets and exercise programs as time goes on.

A restrictive, very low calorie, protein-sparing diet with intense exercise should be administered for a short period of time, until the patient is able to see and appreciate the results. At this time, the intensity of the diet and exercise should ease up (perhaps to a moderately hypocaloric diet with emphasis on decreased inactivity) for a moderate period of time. This will give the patient 'time off' and allow them to restart another cycle of intense dieting and exercise. A second cycle of increased weight loss will again give the individual incentive to continue. In such a program, the goal of decreasing one's weight is long-term, but short intervals of increased weight loss give the patient incentive to continue towards achieving the final goal. It would, of course, be crucial that the patient's family be actively involved in the program and that frequent visits, weekly or bi-monthly, be made with the physician administering and monitoring the regimen.

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