

Prevention and Treatment of Obesity - An Over View

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Abstract: Five major approaches namely dietary, exercise, behavior, combination and pharmacy therapies are used for treatment and control of obesity. In dietary therapy, low-calorie diet (LCD), which provides 800 to 1500 kcal of energy daily; a very-low-calorie diet (VLCD), which provides 250-800 kcal of energy daily and an energy-restricted or hypo caloric diet (HCD), which is based on a person's estimated daily energy requirement. LCDs can reduce total body weight by an average of 8 percent and help reduce abdominal fat content over a period of approximately 6 months. VLCDs are not recommended for weight loss therapy because the deficits are too great, and nutritional inadequacies will occur unless VLCDs are supplemented with vitamins and minerals. Regular exercise/physical activity should be an integral part of weight loss therapy and weight maintenance. A daily regimen of 30-45 minutes of walking, bicycling or working around the house conveys physical activity's positive effects on the musculo-skeletal, cardiovascular, respiratory and endocrine systems, reduces risk of premature mortality, coronary heart disease, hypertension, colon cancer and diabetes. Exercise should be initiated slowly, and the intensity should be increased gradually; starting from small tasks of daily living such as taking the stairs or walking or swimming at a slow pace leading to the more strenuous activities like brisk walking, cycling, exercise, rope jumping and Jogging. Behavior therapy provides methods for overcoming barriers to compliance with dietary and exercise therapies. Combined intervention of an LCD, increased physical activity, and behavior therapy provides the most successful therapy for weight loss and weight maintenance. Islamic way of life (directional eating) and lifestyle (worship schedule) is the most efficient method for prevention and control of obesity and is one of the best example of combination of diet and exercise therapies. Pharmacotherapy or medication should be the last approach for obesity control.

Key words: Obesity, prevention, treatment, diet, exercise, behavior, therapy

Introduction

Prevalence of obesity is epidemic and is a potential hazard for health. Measures for treatment and control of obesity must be in the priority list of the health sector. Prevention is the priority choice and it can be achieved through reduced energy intake and active life style. However, once obesity occurs, then various therapies or control measures are adopted to treat/control obesity. The prevalence and etiology of obesity has been reported (Afridi and Khan, 2003). This paper reports the various therapies used for treatment and control of obesity. The most important approaches for obesity control are summarized here.

Dietary therapy: As the fundamental cause of obesity is excessive energy intake, therefore the basic means of obesity prevention pertain to reducing energy intake, increasing energy expenditure or both. Methods range from caloric restriction to change in dietary proportion of fat, protein or carbohydrate or use of macronutrient substitutes. Appropriate dietary programs can have positive health effects on factors other than weight loss. Dietary energy restriction is widely viewed as essential to successful weight loss (Koplan and Dietz, 1999). Most experts support a diet abundant in complex

carbohydrate, restricted in total fat, and moderate in protein (Katz, 2001).

Dietary therapy for obesity usually is combined with other weight reduction methods that include behavioral therapy, dietary counseling, and physical exercise. The three main types of dietary therapy are a low-calorie diet (LCD), which provides 800 to 1500 kcal of energy daily; a very-low-calorie diet (VLCD), which provides 250-800 kcal of energy daily and usually consists of a protein-enriched liquid; and an energy-restricted or Hypo Caloric Diet (HCD), which is based on a person's estimated daily energy requirement (I e, basal metabolic rate $\times 1.3$). Supervised dietary interventions include reduction in caloric intake to low (1200-1500 kcal) or very low (<800 kcal) levels, reduction in fat intake to 10%-15% of calories, or reduction of both caloric and fat intakes. In clinical practice, two or more of these modalities are often used in combination.

Many of these LCDs also promote low fat intake as a practical way to reduce calories (Stefanick *et al.*, 1998; Marks *et al.*, 1995; Dengel *et al.*, 1995; Andersen *et al.*, 1995; Katzel *et al.*, 1995; Davis *et al.*, 1993; Hellenius *et al.*, 1993; Karvetti and Hakala, 1992; Oberman *et al.*, 1990 and Fortmann *et al.*, 1988). The recommended LCD contains a nutrient composition that will decrease

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other risk factors, notably, high serum cholesterol and hypertension. The composition of LCD is as follow.

Calories: Approximately 500-1000 kcal/day reduction from usual intake. [A reduction in calories of 500-1,000 kcal/day will help achieve a weight loss of 1-2 lb/week. Alcohol provides unneeded calories and displaces more nutritious foods. Alcohol consumption not only increases the number of calories in a diet but has been associated with obesity in epidemiological studies (Tremblay *et al.*, 1995; Veenstra *et al.* 1993 and de-Castro and Orozco, 1990) as well as in experimental studies (Tremblay *et al.*, 1995; Tremblay and St-Pierre, 1996).

Total fat: 30 % or less of Total calories. [Fat-modified foods may provide a helpful strategy for lowering total fat intake but will only be effective if they are also low in calories and if there is no compensation of calories from other foods].

Saturated fatty acids: 8-10% of total calories.

Monounsaturated fatty acids: Up to 15 percent of total calories.

Polyunsaturated fatty acids: Up to 10 percent of total calories

Cholesterol: <300 mg/day. [Patients with high blood cholesterol levels may need to use a diet, having cholesterol level less than 200 mg/day and saturated fats providing less than 7 percent of total calories].

Protein: Approximately 15 percent of total calories. [Protein should be derived from plant sources and lean sources of animal protein].

Carbohydrates: 55 percent or more of total calories. [Complex carbohydrates from different vegetables, fruits, and whole grains are good sources of vitamins, minerals, and fiber. A diet rich in soluble fiber, including oat bran, legumes, barley, and most fruits and vegetables may be effective in reducing blood cholesterol levels. A diet high in all types of fiber may also aid in weight management by promoting satiety at lower levels of calorie and fat intake. Some authorities recommend 20 to 30 grams of fiber daily, with an upper limit of 35 grams (Butrum *et al.*, 1988)].

Sodium chloride: No more than 100 mmol per day (approximately 2.4 g of sodium or approximately 6 g of sodium chloride).

Calcium: 1,000-1,500 mg [During weight loss, attention should be given to maintaining an adequate intake of

vitamins and minerals. Maintenance of the recommended calcium intakes of 1,000-500 mg/day is especially important for women who may be at risk of osteoporosis (NIH, 1994)].

Fiber, 20-30gm: The centerpiece of dietary therapy for weight loss in overweight patients is a low-calorie diet. LCDs can reduce total body weight by an average of 8 percent and help reduce abdominal fat content over a period of approximately 6 months (Wadden, 1989). When weight loss occurs, the loss consists of about 75 percent fat and 25 percent lean tissue (Yang and VanItallie, 1992). A deficit of 500-1,000 kcal/day will produce a weight loss of 70-140 grams/day and a deficit of 300-500 kcal/day will produce a weight loss of 40-70 grams/day. A patient may choose a diet of 1,000-1,200 kcal for women and 1,200-1,500 kcal for men.

A variety of VLCDs often used as a component of commercial weight-loss programs or available through the use of formula diets or drinks have shown only short-term benefits without evidence of long-term success (Atkinson, 1996). For most individuals who use dieting as a means to lose weight, it has been reported that most of the weight lost in the early phase (16-20 weeks) is regained within 2-5 years (Skender *et al.*, 1996). VLCDs are not recommended for weight loss therapy because the deficits are too great, and nutritional inadequacies will occur unless VLCDs are supplemented with vitamins and minerals (NIH, 1993). Moreover, clinical trials show that LCDs are just as effective as VLCDs in producing weight loss after 1 year (Wadden *et al.*, 1994).

Although more weight is initially lost with VLCDs, more is usually regained (Wadden *et al.*, 1994, 1990; Wadden, 1989). Further, rapid weight reduction does not allow for gradual acquisition of changes in eating behavior. Successful behavior therapy is the key to long-term maintenance of weight at a reduced level. Finally, patients using VLCDs are at increased risk for developing gallstones. Successful weight reduction by LCDs is more likely to occur when consideration is given to a patient's food preferences in tailoring a particular diet. Care should be taken to be sure that all of the recommended dietary allowances are met; this may require use of a dietary supplement. Dietary education is a necessary ingredient in achieving adjustment to an LCD.

Educational efforts should pay particular attention to the energy value of different foods, food composition i.e. fats, carbohydrates (including dietary fiber), and proteins, food preparation, i.e. avoiding adding high-calorie ingredients during cooking (e.g., fats and oils), avoiding over consumption of high-calorie foods (both high-fat and high-carbohydrate foods) and maintaining adequate water intake, reducing portion sizes and limiting alcohol consumption.

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A moderate amount of physical activity can be in a variety of ways as follow.

Examples of Moderate* Amounts of Activity

Washing and waxing a car for 45-60 minutes
Washing windows or floors for 45-60 minutes
Playing volleyball for 45 minutes
Playing touch football for 30-45 minutes
Gardening for 30-45 minutes
Wheeling self in wheel-chair for 30-40 minutes
Walking 1¼ miles in 35 minutes (20 min/mile)
Basketball (shooting baskets) for 30 minutes
Bicycling 5 miles in 30 minutes
Dancing fast (social) for 30 minutes
Pushing a stroller 1½ miles in 30 minutes
Raking leaves for 30 minutes
Walking 2 miles in 30 minutes (15 min/mile)
Water aerobics for 30 minutes
Swimming laps for 20 minutes
Wheelchair basketball for 20 minutes
Basketball (playing a game) for 15-20 minutes
Bicycling 4 miles in 15 minutes
Jumping rope for 15 minutes
Running 1½ miles in 15 minutes (10 min/mile)
Shoveling snow for 15 minutes
Stair walking for 15 minutes

Less vigorous, more time**



More vigorous, less time

* A moderate amount of physical activity is roughly equivalent to physical activity that uses approximately 150 calories of energy per day or 1,000 calories per week.

** Some activities can be performed at various intensities; the suggested durations correspond to expected intensity of effort.

Exercise therapy/physical activity: Physical activity is of particular importance in weight maintenance (Koplan and Dietz, 1999). Regular physical activity contributes to a healthy lifestyle, prevents chronic disease and prevents obesity (Pratt *et al.*, 1999). Regular, preferably a daily regimen of 30-45 minutes of walking, bicycling or working around the house conveys physical activity's positive effects on the musculo-skeletal, cardiovascular, respiratory and endocrine systems, reduces risk of premature mortality, coronary heart disease, hypertension, colon cancer and diabetes (US Department of Health and Human Services, 1996). Furthermore, regular physical activity has been shown to reduce depression and anxiety, improve mood, and enhance ability to perform daily tasks throughout the life span. The magnitude of weight loss with regular exercise alone is modest and generally less than that achieved with caloric restriction (Garrow and Summerbell, 2001; Zachwieia, 1996; Saris, 1995). Exercise in combination with caloric restriction leads to relatively greater fat loss (Ballor and Poehlman, 1994), preserves lean body mass, and has been shown to maintain initial weight loss (Miller *et al.*, 1997; Zachwieia, 1996). Physical activity and the increased muscle mass that results may partially counteract the decline in basal metabolic rate that typically accompanies weight loss, conferring some protection

against weight regain (Leibel *et al.*, 1995). Even in the absence of significant weight loss, regular exercise often confers considerable health benefits, including salutary effects on the lipid profile, improved cardiovascular fitness, enhanced psychological well-being, and reduced risk of mortality (Rippe and Hess, 1998).

The amount of weight loss through exercise usually ranges from 2-7 Kg (Garrow and Summerbell, 1995; Bertram *et al.*, 1990; Verity and Ismail, 1989). This amount is usually in addition to that lost through caloric restriction. Regular physical activity should be an integral part of weight loss therapy and weight maintenance. Initially moderate levels of physical activity for 30-45 minutes, 3-5 days per week, should be encouraged (NHLBI, 1998). Most weight loss occurs because of decreased caloric intake. Sustained physical activity is most helpful in the prevention of weight regain (Bogardus, 1986; Brook, 1977).

Many people live sedentary lives, have little training or skills in physical activity, and are difficult to motivate toward increasing their activity. For these reasons, starting a physical activity regimen may require supervision for some people. The need to avoid injury during physical activity is high priority. For most obese patients, physical activity should be initiated slowly, and the intensity should be increased gradually. Initial

activities may be small tasks of daily living such as taking the stairs or walking or swimming at a slow pace. With time, depending on progress, the amount of weight lost, and functional capacity, the patient may engage in more strenuous activities. Some of these include brisk walking, cycling, exercise and rope jumping. Jogging provides a high-intensity aerobic exercise, but can lead to orthopedic injury. If jogging is desired, the patient's ability to do this must first be assessed. The availability of a safe environment for the jogger is also a necessity. Competitive sports, such as tennis and volleyball, can provide an enjoyable form of physical activity for many, but again, care must be taken to avoid injury, especially in older people. People can select activities that they enjoy and that fit into their daily lives. Because amounts of activity are functions of duration, intensity, and frequency, the same amounts of activity can be obtained in longer sessions of moderately intense activities such as brisk walking and in shorter sessions of more strenuous activities such as running.

A regimen of daily walking is an attractive form of physical activity for many people, particularly those who are overweight or obese. The patient can start by walking 10 minutes, 3 days a week, and can build to 30 to 45 minutes of more intense walking at least 5 days a week and preferably most, if not all, days (NIH, 1996 and Patte *et al.*, 1995). With this regimen, an additional 100 to 200 calories per day of physical activity can be expended. Caloric expenditure will vary depending on the individual's body weight and intensity of the activity

This regimen can be adapted to other forms of physical activity, but walking is particularly attractive because of its safety and accessibility. With time, a larger weekly volume of physical activity can be performed that would normally cause a greater weight loss if it were not compensated by a higher caloric intake.

Reducing sedentary time, i.e., time spent watching television or playing video games, is another approach to increasing activity. Patients should be encouraged to build physical activities into each day. Examples include leaving public transportation one stop before the usual one, parking farther than usual from work or shopping, and up stairs instead of taking elevators or escalators (NIH, 2000)

Behavior therapy: Behavior therapy, in combination with an energy deficit and increased physical activity, provides additional benefits in assisting patients to lose weight in short-term (1 year). Its effectiveness for long-term weight maintenance has not been shown in the absence of continued behavioral intervention.

Behavior modification involves the following steps.

- 1 Identifying eating or related life style behaviors to be modified.
- 2 Setting specific behavior goals.
- 3 Modifying determinant of behavior to be changed.
- 4 Reinforcing the desired behavior.

The goal of behavior change is to modify eating and physical activity habits typically focusing on gradual changes. Behavior modification can be undertaken through group or individual sessions, under the guidance of professionals and alone in conjunction with other approaches (NIH, 1993).

The primary assumptions of behavior therapy are that by changing eating and physical activity habits, it is possible to change body weight. Patterns of eating and physical activity are learned behaviors and can be modified and to change these patterns over the long term, the environment must be changed.

Behavior therapies provide methods for overcoming barriers to compliance with dietary therapy and/or increased physical activity, and are thus important components of weight loss therapy. Most weight loss programs incorporating behavioral strategies do so as a package that includes education about nutrition and physical activity. However, this standard "package" of management should not ignore the need for individualizing behavioral strategies (Wadden and Foster, 1992).

The most difficult step in behavior modification is to convince the obese individual for behavior modification. However if he is explained the benefits of good health and the hazards of obesity with sympathy and love, he may agree for behavior change. Of course, the change should be gradual, accommodative and interesting.

Focusing on dietary and exercise changes, that will lead to permanent weight loss is much more productive. People, who are successful at managing their weight, set only two to three goals at the time. The effective goals should be specific and realistic. The ultimate goal should be achieved slowly and gradually. For example reduction of fat from 40% of calories to 35% of calories and ultimately to 30% is based on the concept, "Nothing succeeds like success".

In general, visible and reachable food items often lead to unplanned eating. It is therefore important that food items should be placed hidden and away from the general sitting. Meeting in canteen guarantees a cup of tea or more. Also one should not eat while watching a newspaper or T.V. After eating, the eating place should be left. Eating slowly, using smaller plates for eating, eating lots of vegetables and fruit, specific time for eating and drinking lot of water are some other points for behavior modification of obese individuals (NIH, 2000).

Combination of therapies

To achieve the greatest likelihood of success from weight loss therapy, the combination of dietary therapy with an LCD, increased physical activity, and behavior therapy will be required. Inclusion of behavior therapy and increased physical activity in a weight loss regimen will provide the best opportunity for weight loss, and hopefully for long-term weight control. In order to achieve weight loss, such a regimen should be maintained for at least 6 months before considering pharmacotherapy.

Combined intervention of an LCD, increased physical activity, and behavior therapy provides the most successful therapy for weight loss and weight maintenance. Clinical trials have demonstrated that combining behavior therapy, LCDs, and increased physical activity provides better outcomes for long-term weight reduction than programs that use only one or two of these modalities. A lower-fat diet markedly improves the potential of physical activity to achieve a negative energy balance (Schlundt *et al.*, 1993 and Hammer *et al.*, 1989). In addition, lower-fat diets that are also low in saturated fats reduce serum cholesterol levels, which would reduce CVD risk. It is difficult to achieve a negative energy balance and weight loss with physical activity of moderate duration and intensity in individuals who consume a high-fat diet and alcohol (King and Blundell 1995; Tremblay *et al.*, 1994).

Islamic way of eating and lifestyle is the most efficient method from prevention and control of obesity and is one of the best example of combination therapy. A person, who has adopted, in real sense, the Islamic way of life, will never become overweight or obese. Even obese individuals can be rescued their body weight by fully adopting the Islamic way of Life. Islamic way of life has the energy restriction component, the moderate exercise component and the behavior component. All these three components make, the vary acceptable combination therapy for weight control (Khan *et al.*, 1993).

In Islam eating is a duty and requirement of life and it should be performed in a directional way. The directions and guidelines of Islam always stand for Quarnic commandments and the explanation of these commandments by the Prophet Muhammad (*Sallallaaho Alaihe Wa Sallam*) and the prophet's own sayings.

The directions and guidelines for eating in Islam are:

- 1 Eat and drink but do not waste.
- 2 Start eating with the name of Allah and stop eating with thanks to Allah.
- 3 Wash your hands before start of eating.
- 4 Eat in a group of two or more with the intention that the partner in the eating should eat more and good food.
- 5 Eat slowly with honor, dignity and concentration.
- 6 The Islamic saying, "The food of one is sufficient for two", is a good example of control eating (Naumani, 1982).
- 7 The instruction "Stomach should be divided in three portions, one for food, one for water and one for air" is again a good example of control eating (Kandhlavi, 1368H=1947).

In Islam there is one month obligatory fasting in a year and eleven days non-obligatory fasting in each month of the year. Devoted Muslims observe these fasting. In

fasting, there is a constant restriction on eating schedule. The time related ban on eating during fasting, do not let the individual to eat more than his requirement. Also the time related ban on food intake and change in eating schedule may have an effect on body biochemical and physiological functions (Sulamini, 1988; Hussain, 1987; Gumma, 1987; Fedail *et al.*, 1982; Mustafa, 1978; Sakar, 1975).

The disciplined and control eating and the time related ban on eating during fasting don't let the individual to eat more than his requirement. Participation in the various religious activities, particularly the five times daily congregational prayer make the individual at par with those who are doing moderate exercise. This really makes the combined therapy, which can best prevent and control obesity.

Pharmacotherapy: Pharmacotherapy is generally reserved for patients with BMI ≥ 30 (27 if significant co-morbid conditions are present). Multiple randomized controlled trials of appetite suppressant drugs, funded principally by the pharmaceutical industry, have demonstrated effectiveness in short term weight loss (Bray *et al.*, 1999 and Guy-Grand *et al.*, 1989). Weight is generally regained when medication is discontinued, however, the safety of long-term medication use is uncertain (Ryan, 1996). The combination of fenfluramine or dexfenfluramine with phentermine, commonly known as fenphen, was linked to cases of cardiac valvular injury, leading to the withdrawal of fenfluramine and dexfenfluramine from the market in 1997 (Weissman *et al.*, 1998). Recently approved medications for weight loss include sibutramine, a reuptake inhibitor of nor-epinephrine and serotonin, and orlistat, an inhibitor of intestinal lipid per-oxidase (Davidson *et al.*, 1999 and Lean, 1997). In a 2-year randomized placebo controlled trial of the latter, the treatment group that received dietary intervention and orlistat lost more weight and was slightly less likely to regain the lost weight than control subjects treated with placebo (Davidson *et al.*, 1999). In addition to relatively greater weight loss, a recent randomized controlled trial suggests that use of orlistat by obese adults may delay or prevent the onset of diabetes (Heymsfield, 2000). The effect of currently available medications on weight loss appears rather modest, and efficacy may plateau with sustained use. It has not yet been established that long term weight loss maintenance can be achieved through use of medications (Ryan, 1996).

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