OBESITY AND HEALTH : A REVIEW

A Case Study By OGBU C E and OGBU C S, Nigeria
(Medical Officer at Cottage Hospital Tsaragi, Kwara State)
Email- emekab4u@yahoo.com

ABSTRACT

Obesity is an urgent and growing global health problem of critical concern. The causes of this epidemic are complex and multifactorial, but fundamentally lead to an excess calorie intake and inadequate energy expenditure. Modern lifestyles, incorporating altered eating patterns, access to cheap, highly palatable, energy-dense yet nutritionally-poor foods, sedentary life-style and labour-saving devices which reduce physical activity have hugely accelerated the problem during the latter part of the 20th century.

Obesity is a complex condition, with serious social and psychological dimensions, affecting virtually all ages and socioeconomic groups . The health consequences range from increased risk of premature death, to serious chronic conditions that reduce the overall quality of life. Of special concern is the increasing incidence of childhood obesity. The literature has been extensively reviewed to give an overview of the causes, the health problems associated with this disorder, the mode of assessment of the degree of obesity, its consequences, various methods of managing obesity with particular emphasis on dieting, exercise and the possible use of drugs (anorexiants) as well as surgery.

KEYWORDS: Obesity, anorexiants, nutritionally-poor, multifactorial.

INTRODUCTION

The problem of obesity is a source of concern due to its high rate of morbidity and mortality(Peeters *et al*, 2003) The prevalence of obesity is seen not only in the Western World but also in the poorest developing countries, amongst the successful group; readily recognizable by their protruding abdomen who can afford to overeat and overdrink. The problem is actually worse in the developed countries of the world (Friel *et al*, 2007). It has been observed that the site in which excess fat tends to accumulate like the abdominal wall, the hips, thighs and the chest could bear important relationship to the development of some of the most chronic diseases of our time (Datillo and Kris, 1992).

There are functional differences between adipose tissue in the abdominal region and that in the gluteal – femoral region. It has been found that during stress, there is a release of catecholamines, which

preferentially cause increased lipolytic activity, together with depressed lipoprotein lipase activity, in abdominal adipocytes as compared with femoral adipocytes (Larasson *et al*, 1984). There is high concentration of free fatty acids (FFA) released in the liver from the portal vein, which predisposes to the risk of diabetes mellitus and cardiovascular diseases. It has been emphasized that obesity is associated with considerable pain, decreased physical function and vitality, worry, depression, social and psychological handicaps (Fine *et al*, 1999). It has also been linked to eating disorders and low self-esteem (Yanovski *et al*, 2002). This article is therefore aimed at high lighting the etiology of obesity, its classification, its assessment, associated health problems and its overall management.

ETIOLOGY

Overweight is defined as a BMI greater than 25kg/m2 while obesity is defined as a BMI(Body Mass Index) of 30kg/m2 or more (Salem and Bloom, 2010). Obesity is a complex problem resulting from a combination of medication, genetic, behavioural, environmental, cultural and socioeconomic influences. Drugs such as steroids, contraceptive pills, antidepressants and many others have been shown to cause obesity as side effects (Suter, 1994).

Genetic influence has an important role to play in the etiology of obesity. An individuals' resting metabolic rate, which accounts for the vast majority of energy expenditure is determined in part by genetics (Chagnon *et al*, 2003). Obesity often runs in families since families tend to share lifestyle habits as well as genes.

Recently, Froguel and colleagues have identified two alleles of an appetitie-stimulating gene called GAD2, which codes for an enzyme, glutamic acid decarboxylase that catalyzes the production of a neurotransmitter, gamma-amino butyric acid (GABA) that interacts with a neuropeptide Y (NPY) in the hypothalamus to help stimulate appetite (Froguel *et al*, 2003). One form of the gene was found to be protective against obesity, while the other increased the risk of obesity.

Feeding habit is an aspect of behavioural factor that cannot be overlooked. Obesity is primarily caused by an excess of food intake and inadequate energy output, whether from habit, greed or to compensate for stress or psychological problems coupled with sedentary lifestyle (Wesley *et al*, 2007).

Environment, too, can play a significant role. Parental neglect and physical, verbal or sexual abuse during childhood have been linked to obesity in later life (Lissau and Sorenson, 1994; Williamson *et al*, 2002).

CLASSIFICATION OF OBESITY

It is almost meaningless to state merely that a patient is obese without specifying the kind of obesity because the consequences of the different forms are so different. Two types of obesity have been identified, one termed android (central obesity) in which the fat is mainly on the upper part of the trunk (on the chest and abdomen) while the other called gynoid (peripheral obesity) in which the fat is mainly around the hips and thighs (WHO Bulletin, 1986).

Both forms of obesity could be observed in each of the sexes but the android form is more characteristic of the male while the gynoid of the female. Studies have shown that there are functional differences between

the different fat depots in women in relation to physiological state like pregnancy, lactation, and with age before and after menopause (Beazley,1995).

ASSESSMENT OF OBESITY

The accepted best guide to measure overall adiposity or obesity is the body mass index (BMI) or quetelet index (Stunkard *et al*,1990), defined as weight in kilograms divided by the square of height in meters (BMI=kg/m2) or as weight in pounds multiplied by 705 and then divided twice by height in inches. BMI is considered a reasonable surrogate measure of overall adiposity in the general population. Waist/hip circumference ratio (WHR), a surrogate measure of intra-abdominal or central obesity, predicts long-term disease risk in both men and women, independent of BMI (Rexrode *et al*, 1997).

CONSEQUENCES OF OBESITY

The evidence for the adverse effects of obesity in the general population is overwhelming and indisputable. Many studies have shown a positive association between increasing BMI and greater health risk (Datillo and Kris, 1992). Those of particular interest include medical, gynecology and obstetrics and social problems.

MEDICAL PROBLEMS

METABOLIC SYNDROME

Several studies have demonstrated that overweight and obese individuals are at increased risk of developing what is referred to as metabolic syndrome or disorders whereby there is deleterious changes in the metabolic pathways (Cook *et al*, 2003). For most patients, the root causes of the metabolic syndrome are improper nutrition and inadequate physical activity (Friel, 2007). Other factors characteristic of the metabolic syndrome are atherogenic dyslipidemia (elevated triglyceride levels), raised blood pressure and insulin resistance.

CARDIOVASCULAR DISEASE

Overweight and obese people are at substantially elevated risk for developing hypertension. The mechanism for the relationship between body weight and blood pressure has not been fully elucidated. Obese individuals have high concentrations of plasma thrombogenic factors, such as fibrinogen, factor VII and Plasminogen activator inhibitor-1 (PAI-1) which predispose to cardiovascular diseases (Ridker, 1999).

Diabetes Mellitus

Abdominal obesity appears to be a strong predictor of diabetes in women than in men, independent of BMI and waist circumference (Carey *et al*,1997). The ability of obese patient to produce excess FFA, which accumulates in the liver, inhibits the hepatic clearance of insulin leading to peripheral hyperinsulinemia.

Other chronic diseases

Obesity is also associated with the incidence of several major cancers, including postmenopausal breast cancer, cancers of the colon, endometrium and kidney (American Institute For Cancer Research Bulletin, 1997). In addition it predisposes some individuals to increased risk of stroke, asthma, and sleep apnea (Young *et al*, 2002; Rexrode *et al*, 1997, Carmago *et al*,1999).

Increased Mortality rate

Obesity is associated with a significantly increase in premature mortality in adulthood. A body weight of 10% above average is accompanied by a significant increase in mortality for both men and women. Conversely, weight loss has a favourable effect on mortality (James, 1991).

GYNECOLOGY AND OBSTETRIC PROBLEMS

Menstrual disorders such as irregular menstruation, scanty menstruation and occasional amenorrhea are common features in obese women. These have been attributed to the abnormalities of sex hormone metabolism in obesity particularly increased production rates of adrenal androgens, increased estrogen production and increased peripheral conversion of androgens to oestrogens (Suter, 1994).

Labour: Obesity in women can cause serious pregnancy-related complications. One of the outcomes associated with maternal overweight and obesity include labour and delivery complications. Labour is reported to be difficult and prolonged in obese women due to the poor quality of the abdominal muscles (Cedergren, 2004), non-engagement of the head in the presence of fat within the pelvis, ineffective uterine contraction and the excessive size of the baby. These often result in high incidence of surgical intervention to secure delivery.

Other pregnancy-related complications associated with obesity are birth defects, especially neural tube defects, infertility, fetal and neonatal death and delivery of large-for-gestational age (LDA) infants (Pandey and Bhattacharya, 2010).

SOCIAL PROBLEM

Being overweight tends to be more of a social problem for a woman than a man. The oversize and shapeless figure of an obese woman often constitute an embarrassment to her and apparently affects her confidence

negatively. It could also affect her chances of getting married. The loss of interest in her by the male partner can have a paradoxical effect whereby she resorts to excessive eating in order to console herself. This ultimately results in inferiority complex and anti-social behaviour (Yanovski *et al*, 2002).

MANAGEMENT OF OBESITY:

The primary goal of obesity treatment is to improve the patient's health and quality of life through dietary changes, regular exercise, pharmacotherapy and as last resort, surgery in severe obesity. Weight loss is a key therapeutic objective. Intentional weight loss of any amount in women between 40-60 years of age who had never smoked was associated with reduction in mortality (Williamson *et al*, 1995). Modest weight reduction has been associated with significant improvements in hypertension, lipid abnormalities and glycemic control (Tuck *et al*, 1981; Dattilo and Kris, 1992).

Dietary Change: Education on the type of food to be taken is very important and eating in between meals should be discouraged. Successful weight loss requires that more energy be expended than consumed on a daily basis. The key to all positive long-term dietary changes, however is to adopt what is called the "prudent diet" which emphasizes lots of vegetables, fruits, whole grains, fish and low-fat dairy products (Bonow and Eckel, 2003; Wesley, 2007) as against the "western diet" which comprises of red meat or processed meat, a lot of fries, high-fat-dairy products, refined grains, sweets and desserts.

Exercise: There is a consensus that virtually all individuals, not only obese persons can benefit from regular physical activity. An exercise program of moderate physical activity, if undertaken regularly by overweight individuals can increase maximal oxygen uptake and thus cardio-respiratory fitness and weight loss (Bertram *et al*, 1990). Clinical guidelines suggest life-style-based approaches for at least six months before embarking on drug therapy.

Pharmacotherapy : Weight loss medications have the sole objective of suppressing appetite. The use of anti-obesity drugs should be considered as an adjunct to diet and exercise modification when reduced calorie diet and life-style changes do not promote weight loss after a period of time. When used alone, anti-obesity drugs have been associated with suboptimal weight loss. Unfortunately, drugs currently available for long-term weight management are limited in number and efficacy. Some of these drugs have been removed due to significant side-effects such as hypertension, severe mood disturbance, cardiovascular pathology and increased mortality(Salem and Bloom, 2010). Currently available compounds include :

i.**Sympathomimetic-amphetamine-like drugs-** At present, there remains three sympathomimetic amphetamine-like drugs as weight-loss adjuncts. These include **Phentermine**, **diethylpropion** and **Phendimetrazine**. This class of drugs has been associated with systemic and pulmonary hypertension as well as the potential for abuse and addiction, thus approved only for short term use(Ioannides-Demos et al, 2006).

ii. **Sibutramine** (*Meridia ; Abbot*) belongs to a class of selective serotonin and norepinephrine re-uptake inhibitors that elevate synaptic concentrations of 5-hydroxytryptamine(5HT). It may also increase energy expenditure through sympathetic activation. It induces both decreased food intake and increased thermogenesis. Significant adverse effects seen with this drug include hypertension, tachycardia, headache, insomnia, constipation and dry mouth and may be a cause for concern(Padural et al, 2007)).

iii. **Orlistat** (*Xenical ;Roche*), an irreversible inhibitor of intestinal lipases which decreases fat absorption in the intestine by inducing stool excretion of about one third of all dietary fat has been shown to achieve a significant weight loss in obese persons. Most common adverse effects reported with the drug include gastrointestinal discomfort and fecal urgency. This mix of modest weight loss and often intolerable side effects leads to high attrition rates in users. However because it decreases fat soluble vitamin absorption, vitamin supplementation is recommended(Padural et al, 2007).

iv. **Surgical Intervention :** Gastrointestinal surgery is the most effective treatment for severely obese persons who fail to loss weight through diet, exercise and medications or who have serious obesity-related health problems. Weight loss surgeries are of two types: malabsorptive or restrictive operations. The most common malabsorptive operation is gastric bypass (GBP), which is considered the gold standard bariatric operation. However gastric bypass patients require considerable nutritional supplementation and close follow-up, as patients may experience vomiting, weakness, faintness, sweating, diarrhea, and ulcer.

The second type of weight loss surgery is the restrictive operations which reduce stomach size. Adverse effects of this surgery include pulmonary embolism, gastrointestinal leak, deep venous thrombosis and wound infection (Mason *et al*, 1992).

CONCLUSION:

It is necessary to point out that the adverse effects of obesity on health are indisputable. While life-style interventions at personal and societal levels are of the utmost importance, the patients' will power and co-operation is needed to achieve a permanent weight loss which will go a long way to improve the patients' quality of life. Nevertheless, the need for better tolerated and more efficacious pharmacotherapies are undoubted.

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