



A Dietary Intervention to Reduce weight and its Relation with Leptin Hormone among Obese Adults

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Abstract

Obesity is associated with an increased prevalence of metabolic disorder with cardiovascular risk. The increasing incidence of obesity has become important to know the root cause of obesity and how to control the growing incidence of obesity. The prevalence of obesity ranges from 10% to 50%. The increased mortality associated with obesity result primarily from increased risks for cardiovascular disease, high blood pressure, diabetes mellitus and possibly some types of cancer. The paper was prepared at Lucknow City. The 101 patients were selected by purposive sampling method and were studied under two categories; experimental comprising 59 obese subjects and control group 42 obese subjects. The experimental group was examined for their weight and blood leptin level and went under dietary intervention. Leptin is a polypeptide hormone and is circulated with the blood to the brain, predominantly hypothalamus to influence the appetite; energy expenditure and neuro-endocrine function. Problem in the regulation of Leptin Hormone is the cause of change in body weight. High Blood Leptin Level (up to normal limits) decreases the appetite, thus decreasing food intake. The relationship between diet (protein rich diet), weight and blood leptin level was statistically analysed and supported by chi-square. Thus concluding that the diet rich in protein promotes weight reduction by increasing the blood leptin level, vice versa for fat and carbohydrate content is not interfering.

Keywords: Obesity, metabolic disorder, cardiovascular disease, high blood pressure, diabetes II, leptin hormone.

Introduction

Obesity is generally defined as a body mass index (BMI) of 30 kg/m² and higher. The prevalence of obesity seems to be increasing in most European countries. Obesity is usually inversely associated with socioeconomic status, particularly among women. Overweight and obesity are associated with increased mortality and morbidity. Together, they may account for as many as 15-30% of death from coronary heart disease (CHD) and 65-75% of new cases of Diabetes II. In addition, obesity and overweight are associated with an increased risk of disabling conditions such as arthritis, respiratory insufficiency and sleep apnoea and impaired quality of life in general¹. In 1980, a 6% men and 8% of women in U.K. were obese that was increased 21% and 21.4 % during 2000. Approximately, 55% of adult population is over-weight or obese during 2004². MONICA WHO Project shown men 10-23% obesity and in women 9-25% obesity that indicated there is a rapid increase in prevalence of obesity is most centres from the countries in European Union. The mean 17.0; in men and 18.8 in female. According to MONICA STUDY- for Central and Eastern Europe the mean of obesity 16.5 for men whereas mean 30.8 for female. A study by Molaris showed that the social class difference in the prevalence of obesity are increasing with time³. India is currently experiencing a rapid epidemiological transition which has resulted in increased life expectancy and decreased mortality due to better treatment strategies for curing

communicable disease. As a consequence of industrialization and urbanization, there has been an increase in the standard of living, leading to nutritional transition with consumption of diets that are energy dense and rich in fat and sugar content. Moreover, with changes in occupational mobility from predominantly agriculture normal labour jobs to sedentary sitting jobs, there is perceptible decrease in physical activity. There is paucity on nationwide data on the prevalence of obesity that ranges prevalence from 10% to 50%. The rising prevalence of obesity has several health consequences as obesity in predecessor for many related conditions like diabetes, dyslipidemia, hypertension, coronary heart disease etc³. Obesity is defined as “excess of body fat relative to weight”, is the sixth most important risk factor contributing to the overall burden of disease worldwide. Over weight refers to an excess body weight may come from muscle (lean body mass), bone, fat (adipose tissue), sometimes tumors or body fat, it is observed that women have more body fat than man. Most health care providers agree that men with more than 25% total body fat and women with more than 30% total body fat should be considered obese³. Obesity is a state of excess adipose tissue mass. Although often viewed as equivalent to increase body weight. Body weight are distributed continuously, so that a medically meaningful distinction between lean and obese is somewhat arbitrary. Obesity is therefore more effectively defined by assessing linkage to morbidity or mortality⁴. According to

Kopelmann and Grace; obesity is defined as “as a body mass index (BMI) of 30 kg/m² or more where a person’s BMI is defined as their weight in kg divided by height in meter square. Overweight is defined as a BMI between 25-29.9 kg/m²,⁵. According to Jacob C. Seidell, “Obesity is defined as a body mass index of 30 kg/m² and higher, Overweight is defined as a BMI between 25 to 30 kg/m². Now classification of overweight may be based on cut-off points for simple anthropometric measures which reflect both total adiposity and abdominal fatness. WHO have recommended obesity cut-off for Asians to be BMI for overweight 23 to 25 and for obese 25 and above? Leptin was discovered in 1984 as the mutated gene causing over obesity in the ab/ob mouse. It is a systemoid K Da peptide, Cytokine like hormone produce in the fat cells and secreted into the blood stream. It is transported into the brain through the choroiple sex using saturable mechanism, and it is reduce or food intake and stimulate energy expenditure. Leptin functions as a long term regulator of energy balance rather than short-term safety signal. Complete deficiency of leptin leads to severe obesity in human and mice. Leptin has many other actions apart from its anorectic activity. These include effects on bone tumor, regulation of puberty and fertility, and modulation acute-phase response by its capacity to modulate cytokine production. Leptin is a four-helix bundle with one very short strand segment and two relatively long interconnected loops. This consistent with a classification as a cytokine four-helix bundle. Leptin of humans has 146 amino acid sequences containing one disulphide bond. Its molecular weight is around 16 kDa. Leptin has 67% sequence identity among different age⁷. The working of Leptin Hormone: Counteracts the effects of neuropeptide Y (feeding stimulant secreted by cells in the gut wall and in the hypothalamus), Counteracts the effects of amalinate (another feeding stimulant that binds to the same receptors as THC the active ingredient of marijuana), Promotes the effects of alpha-MSH a appetite represent. Resulting in inhibition of food intake. It also stimulate secretion of reproductive hormones such as Gonadotrophin-releasing hormone and thus Leutenizing and Follicle stimulating hormone from the anterior pituitary. It raises the temperature of the subject so energy expenditure is increased. It also acts directly on the cells of the liver and skeletal muscles where it stimulates the oxidation of fatty acids in the mitochondria. This reduces the storage of fat in those tissues (but not adipose tissue). Leptin receptors are also present in T Lymphocytes. Level of Leptin Hormone in the blood is associated with the fat cells in the body. As the fat deposition increases in the body, the level of the leptin hormone also increases in the blood stream. Toxic signals arises from the tissue stores including adipose tissue, and exert a tonic pressure on expression of the appetite. Leptin is secreted by these adipose cell and act primarily through the hypothalamus. Level of Production of leptin provides an index of adipose energy stores⁸. Hormones and other chemical agents affecting obesity. Hormones – Leptin, Adiponectin, IL-6, IGF-1, Resistin, Angiotensinogen. Paracrinelantocrine Mediators - TNF- α , IL-1 β , IL-1 ra, IL-8, Prostanoids. Products of local steroid metabolism- Destrogens, Glucocorticoids. Other molecules with distant nj metabolic effects- Fatty acids.

Table-1
Burden on Obesity

Personal	Medical
Social Isolation	Diabetes
Reduced Job prospects	Cardiovascular disease
Low esteem	Hypertension
Reduced Job prospects	Cancer
Low esteem	Stroke
Sweating	Sleep apnoea
Breathlessness	
Poor Quality of Life	
Marriage Problem	
Reflux oesophagites	
Osteoarthritis	
Gout	

Aims and Objectives: The main objective of the paper to assess the role of diet to reduced weight and its relation with Leptin Hormone among obese adults.

Methodology

Methods and techniques: The study was conducted at Lucknow city, sample size N=101, Protocol Classification; male=40, female;61 constitute experimental group male;23, female;36 and control group male; 17 and female 25.The experimental group underwent dietary intervention for protein rich or carbohydrate or fat rich diet at the interval of two month each. The control group did not undergo any dietary recommendation. The method applied for the collection of primary data in the study was interview cum questionnaire method and each subjects were interviewed in face to face situations, a diet counseling that was prepared which contained food to be allowed and food to be prohibited, along with the special food group recommendation. A null hypothesis i.e. protein rich diet does not decrease the obesity thus increasing the blood leptin level and alternate hypothesis i.e. protein rich diet decreases obesity, thus increasing blood leptin level, was tested.Primary data was tabulated and analyzed in accordance with statistical and scientific method i.e. the skeleton for the test of independence for the variable by the use of chi-square(π^2)

Results and Discussion

Before carrying out dietary intervention trial the following criteria as given the article “New thought on managing obesity was taken into the consideration⁹.

Dietary Treatment

Obesity management = weight loss + weight maintenance + risk reduction
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Low Fat high carbohydrate diet, Fixed Energy Deficient diet, Meal replacement

Key dietary message for maintaining weight :-
Low Fat, particularly saturated fat.
Increase whole grain high fiber carbohydrate.
Increase fruits and vegetables.
Consider portion sizes.

Very low calorie diet, Low glycaemic index diet, High protein low carbohydrate diet

Current Physical Recommended.
For adults, 30 min of moderately intensive activity.

Trial: Requirement of energy was calculated in accordance with basal energy (BMR); Harris Benedicts equation, added 6-10% basal energy for total energy requirement and lastly added 200-300 kcal for working energy. As given by criteria HPIM (1) 16(Harrison Principle of Internal Medicine; RDI.), Protein – 0.6 gm /kg body weight, Carbohydrate – 55-60% of total calorie, Fat-30% (10% saturated and 20% unsaturated), In the first group–60% of more carbohydrate given, 0.6 gm/kg body weight protein, Below 30% fat, Gain in the body weight with no change in blood leptin level. In the second group–Below 50% carbohydrate, 1.25 gm/kg body weight protein, Below 30% fat, Weight reduction was observed with decrease in appetite with the increase in blood leptin level towards the upper limit within normal range. In the third group–55-60% of carbohydrate, 0.6 gm/kg body weight protein 35-40% of fat, No change in weight and no change in blood leptin level was observed.

So it is clear from the above fact that high protein intake increases the satiety and increases the blood leptin level in blood serum. Therefore the major finding of the study was that the high protein intake can increase serum leptin hormone level in blood up to normal level and increases the satiety of obese patients and ultimately reduction in the body weight was observed by decreasing appetite.

Conclusion

The result of the study conducted was concluded in the following findings: The obese subjects consuming protein showed reduction in weight with 49 subjects showing marginal changes, 2 showing moderate changes, 1 showing severe change

but only 7 showed no change in weight reduction. Whereas the carbohydrate rich diet which brought about no change in weight of 54 subjects only 5 subjects showed moderate change of weight reduction. Finally with the administration of fat rich diet it was found that 13 patients showed marginal increase in weight, whereas 5 showed marginal decrease in weight and 41 showed no change in the body weight. The study rejected the null hypothesis that the protein rich diet does not decrease the body weight with the increase in blood leptin level and accepts the alternative hypothesis that the protein rich diet decreases the body weight with the increase in blood leptin level at 1 degree of freedom and 5% level of significance by the chi-square technique. The study concludes that with the increase in protein rich diet thus increase the blood leptin level by shifting it toward the upper limits of the normal level finally decreasing the appetite as well as obesity among the subjects. Further it was also found that : About 47 obese subjects consume normal range of salt up to 6 gm/day followed by 12 obese subjects consuming > 6-10 gm/day. The study rejected the null hypothesis that the protein rich diet does not decrease the body weight with the increase in blood leptin level and accepts the alternative hypothesis that the protein rich diet decreases the body weight with the increase of blood leptin level up to normal. Smoking was found more prevalent among the males. It was discovered that daily smoking subjects were 12 with 46 subjects smoking occasionally and rest no regular smoker in male subjects. Alcohol consumption is more among males than females. There was no subject found who consume alcohol daily but there were 41 subjects found who do not consume alcohol at all, with 11 subjects consuming alcohol occasionally and 7 subjects with regularly consuming alcohol.

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