Obesity and Flying Fitness

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Introduction :

APART from aesthetic considerations, there are many important drawbacks to obesity. Diseases like coronary artery disease, diabetes and hypertension are more often noted in obese individuals. According to acturial assessments, obesity categorically reduces life expectancy. In terms of flying fitness, the obese person has poor tolerance to G forces, altitude and decompression. He is less mobile and agile and is an early victim to locomotor diseases.

Theoretical Aspects [3, 6, 8]

Current research into the origin of obesity has shown that the fat child is the father of the fat adult. Continued consumption of a diet providing more calories than needed by the body is the immediate cause. Availability of food in plenty and paucity for need of physical activity continue to maintain a person obese.

The weight of adipose tissue in an adult male is between 10–20 Kg; its weight is directly proportional to total body weight. This "organ" is one in constant flux with triglycerides being mobilised and laid down under control of the growth hormone, insulin, nor-adrenaline and other hormones as yet to be identified.

Fat cells (Adipocytes) are found in all tissues of the body. In the obese both its number and size increase formidably. The neonates have a fairly constant adipocyte population whose number increases steadily upto puberty. However, under favourable conditions, especially over-feeding, they increase in size and number and remain so even if at a later stage the individual is deprived of calories.

Body fat is produced from triglycerides; carbohydrates help lay it down in the fat cells. Besides in the presence of insulin, carbohydrate itself can be converted into fat.

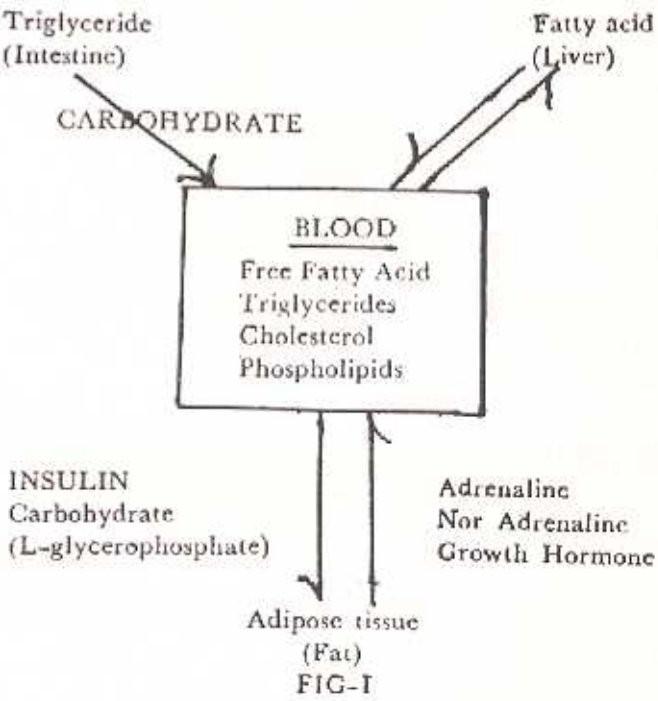

FIG-I

Adipose tissue is an important energy source, providing 38 KJ per gram. This energy output means in terms of physical activity, running fast for one minute.

At this stage it may be possible to draw some conclusions based on these theoretical facts :

—Adipose tissue is not an inert tissue.

—Neonatal or infantile over-feeding leads to obestiy in adulthood.

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—Carbohydrate in the food helps triglyceride absorption from the gut ; insulin converts excess carbohydrates to depot fat.

—Caloric intake and energy expenditure have a very subtle relationship. While a little more exercise is not enough to slim, no exercise leads to accumulation of fat.

To say mere over indulgence with inactivity leads to obesity is indeed an over simplication[3]. Modern life activities like cocktail parties and expense accounts help maintain the adiposity. The genetic contribution to obesity is indeed the bad eating habits learnt in childhood. Many an obese person hopefully tries to blame his glands. Barring the occasional victim of Cushing' syndrome, myxoedema or insulinoma, which are not difficult to diagnose, the only area of an endocrinopathy masquarading as obesity is seen in the case of the adult-type diabetes.

The relationship of obesity and diabetes is very subtle. Insulin is a hormone that not only controls blood sugar it also prevents lipolysis. In the adult obese diabetic, there is no dearth of the amount of insulin produced. But qualitatively their insulin is more lipotrophic than glucostatic. Thus, the obese diabetic is obese because he is diabetic ; obesity may precede the diabetic state by years. In a latent diabetic, obesity may act as a precipitating factor and render the defect obvious chemically or clinically. As regards the other hormones like cortisol, growth hormone, etc. are concerned, their relationship to obesity is ill-understood.

Lastly, the psychological aspects of obesity need to be considered. While it is common knowledge that certain psychiatric and emotional problems alter eating patterns, the exact presentation is often erratic and unpredictable. Depressed individuals come in assorted sizes. Food may be used as a means of not only relieving boredom but also to gratify emotional starvation and repressed sexuality. Whatever be the ill-understood role of psyche' in obesity, it is not a very major determinant.

Assessment of The Fat Patient

Over-weight and obesity should not be confused. Normal weight is obtained from standard weight/height chart adjusted to age/sex. In a healthy person of either sex, body weight should not vary from the age of 25 or so. This "ideal" weight will depend upon the body frame which is not easy to compute. Bi-acromial and bi-iliac diameters, size of hand and feet including 17–18 other measurements are needed for accurate assessment. Other methods like cadaver analysis, use of isotopes to assess lean body mass, densiometry and so on are too cumbersome and time consuming to be applicable in clinical practice.

Any person who exceeds by 10% the "desirable" weight is considered obese ; 30% grossly abese ; 0-10 is probably over-weight.

Incidence of Obesity

Analysis of incidence of obesity as seen at two medical board centres of Air Force Hospital and Institute of Aviation Medicine, Bangalore, shows that 6% of candidates coming for their first medical examination were found to be obese and were made temporarily unfit. Out of 548 serving Officers' medical boards/examinations carried out during the 12 months (Sept 76 to Aug 77) 82 (15%) were found obese. 60% of them were noted to be obese without complication. 30% had associated diabetes and 25% IHD and Hypertension was noted in 15%. Thus, it is to be accepted that there is indeed a problem of obesity that requires assessment and rational tackling.

Obesity Evaluation

Besides going into the family and personal history including early life, particular attention should be given to detailed dietary history, precipitating factors and psychological stresses. Next is a thorough physical examination which should evaluate blood pressure cardiovascular and endocrine status, and defects of locomotor system and any obvious psychiatric problem. As far as the lab tests are concerned, in addition to ECG and X-ray chest, a GTT, PBI or I^{131} uptake, and measurement of serum lipids are required.

Management of Obesity

For treatment purposes, we can divide obese patients into mild (10–20%), moderate (20–30%) and severe (>30%) obesity. Treatment consists of diet, drugs, exercise, psychotherapy and surgery.[2,5,8]

Diet : Since obesity is almost always due to over-eating, it is logical to start dieting all patients irrespective of the degree of obesity. The aim of dieting is not only to reduce the caloric intake but also change the eating habits, so that weight loss occurs and the malnutrition is corrected. The diet

must be individualised ; mere handing out of menu sheets is futile. Time taken in discussing the problem of diet, noting modifications into it and so on will convince the patient of your interest in his cure and will encourage him to follow the do's and dont's. A 1000 cal diet is the best to start with.

A patient on diet must weigh himself every week at the same time, in the same clothes and on the same machine and keep a record. He should also maintain a diary of what exactly he ate and drank each day.

Assessment must be carried out at weekly intervals to begin with, especially if weight loss is negligible or gets static after initial loss. At each visit a different facet of the problem of obesity must be highlighted ; exercise, nibbling, attending parties and so on.

A word about patent or formula diets: They are of definite value only if one can continue them indefinitely. Their monotony and cost preclude permanent adherence. They are, therefore, best avoided. The special ' slimmers ' food contain either excess of sorbitol or a sugar substitute, both of which are undesirable for long term use. The so called bulk substances are also best avoided. While definitely relieving the constipation of a patient on low caloric diet, they do nothing to his appetite or weight.

Drugs : As one does not become fat because of abnormal hunger, it does not seem logical to use an anorectic agent to cure obesity. Majority of the anorectic agents belong to the amphetamine family. There are dangers of addiction, stimulation of the sympathatic nervous system and irritation of the GIT. On the last analysis, many controlled trials have failed to credit them with any long term benefits.

Metabolic stimulators like thyroxine are not recommended. Weight loss occurs only, if it is given in therapeutic doses. Such use merely converts a patient induced disease (obesity) into a doctor induced disease (hyperthyroidism).

Diuretics also fall into the same category. The fluid that accumulates in the fat person will disappear as fat is lost. Fat will remain even if you dehydrate a patient with a diuretic. Before concluding this aspect of management, it must be, however, said the pharmaceutical industry does not easily give up, especially when they have a large clientele looking for an easy way to stay slim. Till they come up with a really ideal agent, the use of drugs to help the obese must remain a query at the best and their universal use is not advisable.

Exercise : Exercise, unless there is some clinical contraindication, must form a regular part of any weight-losing programme. It helps relieve the boredom of the regime of calorie losing ; it tones up the body muscles ; it facilitates better circulation ; it improves the performance of heart and lungs ; it prevents venous stasis and its consequences. A walk at 3 kms/h, 45' fast bicyling ; ½ hour continuous swimming or 45' game of tennis (singles), are useful. The more strenuous the better, in terms of caloric expenditure and weight loss. And, to give sustained benefit it must be regular, and should be progressively increased.

Psychotherapy : Except in cases with overt problems, a commonsense psychotherapeutic approach by the treating physician is adequate in most cases. Some people have claimed benefit by group therapy, as in other behavioral disorders. A good deal of encouragement is needed to loose weight and the Doctor must do everything in his power in this direction.

Severe Obesity

When there is more than 30% departure from ideal weight and when conventional measures have failed, more radical measures are in order [4 (a) & (b)]. They are starvation and surgery.

Starvation : Total fasting (0 calorie) or near-starvation (300-500 calorie) will produce a dramatic result in the obese ; however, weight loss flattens out by 4-6 weeks to less than 50 g daily. Such heroic measures are associated with severe biochemical dangers (hypokalaemia and ketosis), nausea and vomiting, hypotention and azotaemia. Such a situation is not altogether safe ; patients need hospitalisation and very careful later refeeding. An elderly patient may even die under such conditions. This method is not universally applicable nor accepted.

Surgery : Measures include panniculectomy, dental splintage, gastroplasty, gastric and small intestine by-pass.

All these measures are drastic and are indicated in desparate situations. Panniculectomy may help to

streamline the silhoutte by removal of excess subcutaneous adiposity. Dental splintage allows only a liquid diet to be consumed and may be an alternative to starvation programme.

Radical surgery or short circuiting the bowel is not altogether safe. Besides the immediate post-operative complications in an obese patient, such as thrombo-embolism, wound dehiscence and hypostatic pneumonia, the long term problems include diarrhoea, electrolyte and fluid imbalance and a fatal form of "fatty liver".

Effect of obesity on flying

Coming to the hazards to flying fitness posed by obesity, the literature is rather scanty and old. Phillips and Gowdey concluded that the incidence and severity of bends in experimental animals was related to the amount of body fat[7]. Berry examined 125 cases of non-fatal but severe dysbarism in US AF personnel in chamber runs. He found nearly 80% of these were in obese persons[1].

Conclusions :

Obesity is an increasing medical problem in groups of people with access to food in plenty and disinclination to exercise.

While heridity, race and even endocrine glands may play a role in its origin, it is primarily caused by over-eating.

Assessment of obesity and its severity is not easy. However, clinical assessment based upon the standard height, weight, age chart is satisfactory and practical.

The condition being due to over consumption dieting logically is the sheet anchor of successful slimming.

Exercise and psychotherapy are adjuncts to diets.

Drugs and surgery are not an easy answer to obese persons' prayer.

To the flyer, obesity poses the greatest danger from dysbarism.

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