



Obesity in dogs

Bindya Liz Abraham and Siddaling Swamy Hiremath

Obesity is defined as a condition of excessive energy storage in the form of adipose tissue to the degree that it results in adverse effect on the health and life of the individual (National Institute of Health Consensus, 1985). Obesity is said to occur when an individual's weight exceeds its optimal weight for breed, sex or age by 15 per cent (Hompt and Smith, 1981). The prevalence of obesity lies between 15 and 40 percent in dogs and is thought to be approximately nine per cent in cats. Obesity is seen more frequently in females and neutered animals. It is more common in geriatric pets as there is a tendency for lean muscle mass to fall and adipose tissue to accumulate with age. Dogs that are fed home cooked meals, snacks and table scraps have greater tendency to be overweight than those on an exclusive diet or commercial pet foods.

Assessment of degree of obesity

The assessment of obesity can be difficult and various methods have been adopted in the past. Comparison of the pet's present weight with the accepted weight for the breed, age and sex of the pet concerned is an important

method. Assessment of body fat on physical examination has also been used to detect obesity. The loss of "hour-glass appearance" when viewed from above, together with increased fat deposits at the tail head in dogs and inguinal region in cats are useful parameters. In addition, the inability to see and feel the ribs may also indicate the presence of obesity (Edney and Smith, 1986). Ultra sound can reliably measure the amount of fat under the skin from which an estimate of the total body fat can be made. The role of genetic factors is more difficult to assess as it seems to be present in certain family lines.

Etiology

Obesity occurs where there is an excess intake of energy over expenditure. This results in a positive energy balance and ultimately leads to obesity. However, the factors which cause a positive energy balance are complex and involve physiological, genetic and environmental factors. In other words, obesity is not simply due to greed or overeating.

(1) Inadequate satiety signals: Hunger is modified by input from different stimuli. These have a negative feedback effect on the hypothalamus, which controls energy intake. No single factor appears to stop food intake. It seems that several factors are required simultaneously.

(2) Social pressure: Social pressures including competition between animals may increase food intake. Feeding snacks and begging are other important external factors. Some owners overindulge their pet with treats that are energy dense.

(3) Dietary factors: Obesity may be the result of increased size in fat cells or increased number of them. It appears that number of fat cells increases only during a specific stage of life, usually during late foetal development and the growth phase. In maturity, the fat cells increase in size, rather than increase in number. So to prevent obesity, it is important to prevent overfeeding during growth period.

(4) Neutering: Neutering doubles the likelihood of obesity in either sex, though found to be more

Dr. Bindya Liz Abraham MVS.

Centre for Advanced
Studies in Animal Genetics
and Breeding
College of Veterinary And
Animal Sciences, Mannuthy

*Dr. Siddaling Swamy
Hiremath MVS.*

Veterinary Officer
Veterinary Hospital
Mangalore, Karnataka.





prevalent in females (Lewis, 1978). This may be due to the loss of satiety effect of oestrogen or testosterone. The lack of these hormones also cause decreased energy expenditure, leading to obesity (Brown, 1989).

(5) Body energy expenditure: About 60-70 per cent of the consumed energy is used to maintain body functions (homeostasis), 10 per cent is lost as heat of utilization (specific dynamic action or SDA) and the remaining 20-30 per cent used for physical activity. If physical activity is greatly increased, the appetite also gets increased. But where it is reduced, no proportional reduction in appetite may occur. So, in that case, a positive energy balance is easily achieved. A reduction in energy expenditure due to changing family circumstances like children growing up and leaving home may well contribute to the development of the animal's obesity in old age.

(6) Breed Predisposition: Some breeds like Beagles, Basset hounds, Cocker, Collies, Labradors, Dachshunds and Toy poodles are more susceptible to overweight and obesity than others.

(7) Pathological reasons: It is extremely important to examine an obese animal thoroughly to ensure there is no underlying disease process causing an apparent weight gain. Some of them are:

- a) Abdominal enlargement due to ascitis, pregnancy, neoplasia
- b) Diabetes mellitus
- c) Hyper adrenocorticalism
- d) Acromegaly
- e) Hypothyroidism

Pathogenesis/ Mechanism

There are two types of body fat, white and brown fat. Majority of fat is white (95 percent) and only a small amount is brown (five per cent). The white fat makes up the major energy store of the body. The brown fat is used to maintain body temperature and to produce heat. Most of it lies sub-cutaneously round the thoracic region. Both white and brown fat increase in size, when excess calories are consumed and vice versa.

In man, obesity occurs as a result of an increased size in fat cells (hypertrophic obesity) but it can also occur as a result of increase in number of fat cells

(hyperblastic obesity), which one occurs in dogs, is not fully understood. Measures taken to control obesity, reduce the fat cell size, but not their number. The greater the number of fat cells present, the harder it is to lose weight and there is a limit to the amount of weight, which can be lost. Also, the ability to maintain an optimal weight becomes more constrained when there are numerous fat cells. Therefore, the prognosis of a weight loss programme is worse in the latter form of obesity.

III Effects of obesity

Hippocrates was the first to associate obesity with reduced life expectancy, by stating "sudden death is more common in those who are naturally fat than in the lean" (Chadwick and Mann, 1950).

The common nutritional disorder is not just of cosmetic concern as it is seen that obesity may predispose the dog to a variety of different physical conditions, which would be less likely if, they were of normal body weight. Some of them are:

- (a) Heart complaints like congestive heart failure
- (b) Increased pulmonary resistance and tracheal collapse
- (c) Increased post-surgical infections
- (d) Secondary hormonal imbalances like insulin resistance, hyperglycaemia, poor glucose tolerance, impaired release of growth hormone
- (e) Secondary locomotor problems like cruciate ligament damage, intervertebral disc problems, arthritis etc.
- (f) Infertility, silent heat, anoestrus, prolonged inter estrus intervals, smaller litter size and inefficient milk production, dystocia, prolonged labour etc. in bitches.
- (g) Poor heat tolerance
- (h) Neoplasia of the reproductive system either through the increased production of prolactin, cortisol, androgen and estrogen or through the obesity associated hyper insulinemia which stimulates the cell division of cancer cells (Voyles and Mcgrath, 1979).
- (i) Decreased disease resistance to bacterial and viral infections (Williams and Newbenne, 1971).

Therapy

'Prevention is better than cure' also applies to





obesity. Client education is very important to achieve this. Hyperblastic obesity, which will predispose the pet to lifelong problems with weight can be under check this way. Owner should be made aware of the consequences of their pet being obese and encouraged to participate in the weight control regime.

The pet should be checked for any pathological reasons for the overweight when it is presented for examination. If it is simply obese, a proper weight loss programme is to be implemented.

Starvation should not be used as a means of weight reduction because it creates a state of negative nitrogen balance, loss of lean muscle mass and decreased resting metabolic rate (Crane, 1991).

Exercise on its own has little effect in decreasing obesity because strenuous exercise only uses small amounts of energy. However, exercise does increase the resting metabolic rate and there is a tendency to increase the lean muscle mass to cope up with the exercise, with a small loss in adipose tissue. If this is combined with a weight loss programme, a better and more rapid end result will be achieved.

A target weight has to be determined for the pet first. One approach is to try to identify an ideal weight based on the breed, age, and sex of the individual. This may turn difficult with crossbreds. So an alternative is to target for an initial reduction of approximately 15 per cent from the animal's current weight (Edney, 1974). Then reassess the situation when loss is achieved. This gives greater accuracy of ideal weight prediction.

Secondly, the metabolic energy requirement for the animal, at its target weight should be determined. The following equation (Simpson *et al.*, 1993) is recommended:

Metabolic allowance at target weight, $w = 125 \times w^{0.75}$ (kg) = x kilo calories/ day

= 4.184x kilo joules / day

(1 kilo calorie = 4.184 kilo joules)

Feeding levels of 40-60 per cent of maintenance at the target weight are recommended for dog. The amount of food to be offered will be determined by its energy content.

Example

Let target weight = 20 kg

Maintenance allowance at target = $125 \times (20)^{0.75}$
= 1182 kcal (4945 kJ/day)

50% of maintenance allowance = 50% of 1182
= 591 kcal (2473 kJ/day)

Amount of food to be given per day =
909 g

(assuming 65 kcal (272 kJ) / 100 g)

It is always better to make modifications in the normal food, than an entirely new diet. Feeding a diet containing low fat and high fibre content will be helpful. Dietary fibre provides little or no energy when ingested, when compared to fat which provides twice as many calories as soluble carbohydrates or proteins. So a low dietary fat is desirable to counter act obesity (Lewis *et al.*, 1987).

In old dogs, obesity may be even more deleterious than in younger animals due to the additional strain on systems due to the biological effects of ageing and possible progression of chronic diseases. The weight reducing regime advised may differ from that for younger obese subjects. But the owners tend to make an unreasonable thinking that with a relatively short expectancy any way, they would prefer their pet to die fat and happy, rather than lean and miserable!

References

- Brown, R.G. (1989) Dealing with canine obesity *Can.vet.J.* 30: 973-975.
- Chadwick, J. and Mann, N. (1950) *Medical works of Hippocrates*. Oxford, Blackwell publishers. pp: 184.
- Crane, S.W. (1991). Occurrence and Management of obesity in companion animals. *J. Small Anim. Practice*. 32: 275-282.
- Edney, A.T.B. and Smith, P.M. (1986). Studies of obesity in dogs visiting veterinary practices in the United Kingdom. *Veterinary Record*, 118: 391-396.
- Hompt, K.A. and Smith, S.L. (1981). Taste preferences and their relation to obesity in dogs. *Can.vet.J.* 22: 77-80.
- Lewis, L.D. (1978) Obesity in the dog. *J.Am. Anim. Hosp. Assoc.* 4: 402-409.
- Lewis, L.D., Morris, M. L. and Hand, M.S. (1987). Nutrients. Small animal Clinical nutrition 3rd ed. Topeka, K.S., Mark Morris Associates .pp 1-24.
- National Institute of Health Consensus Conference Statement (1985). Health implication of obesity. Dept. of Health and Human Services, Bethesda, pp 5-9.
- Simpson, J.W., Anderson, R.S and Markwell, P.J. (1993) *Clinical Nutrition of the dog and cat*. Blackwell Scientific Publications, London, Edinburgh
- Voyles, B.A. and McGrath, C.M. (1979) Differential response of malignant mammary epithelial cells to the multiplication stimulation activity of insulin. *J. National Cancer Inst.* 62: 557-560.
- Williams, G.D. and Newberne, P.M. (1971). Decreased resistance to Salmonella infection in obese dogs. *Fed. Proc.* 30: 572-575.

