In theory, obesity is an expression of an imbalance between energy consumption and its expenditure. But it is not that simple. The balance between energy consumption and its expenditure is influenced by many factors.

At an individual level, there are factors that are beyond one’s control and cannot be altered. These factors are genetic in nature. Then there are factors, which can be altered or modified. Examples of such modifiable factors include dietary intake, physical activity, behavior and hormonal imbalance.

Factors that cannot be altered

Genetics appears to influence how much fat can accumulate in the body. Approximately 80 % of children born to two obese parents are likely to become obese. And about 80 % of obese children are likely to remain obese in their adulthood.

Body functions such as respiration, heart activity, food digestion and normal day-to-day wear and tear of cells and tissues require energy. The energy expended for these body functions, called resting metabolic rate (RMR) accounts for about 70 % of total energy expenditure on any given day. RMR is person specific and is influenced by many factors including genetics.

Individuals of similar height age, weight, sex and lean body mass can vary in their RMR. And sometimes by as much as 20 %. That is why two persons of identical height, sex, weight and physical activity status may require different caloric intakes to control their weight.

Genetics plays a significant role in predisposing an individual to obesity or its trait. The environmental factors, such as lack of exercise and poor nutrition influence the expression of the trait.

Factors that can be altered

**Dietary intake:** Even a minimal excess of food intake a day over the long term can contribute to obesity. For example, a person eating an extra snack of 50 calories a day will end up consuming additional (50 x 365) 18250 calories over a period of one year, and in so doing gain 5 pounds in weight (a pound of fat is equivalent to 3500 calories). Similarly a person creating a deficit of meager 50 calories a day in his/ her diet can conceivably lose 5 pounds over a year. Creating a daily deficit of 500 calories a day will result on average a loss of one pound in body weight.

**Physical activity:** Physical activity does several things. It burns calories and builds lean muscle mass. It also affects fat distribution and improves psychological functioning. Regular physical activity is proven to reduce the risk of coronary heart disease, hypertension, obesity and diabetes.

Moderate-intensity physical activity is recommended for people with a low level of physical activity. Erratic and infrequent vigorous exercise in a sedentary person should be discouraged in favor of consistent regular moderate level activity.

One other important point to keep in mind is that it is possible to lose weight without physical activity. However, weight maintenance is much more difficult without it.
Behavior: Food and behavior are closely linked. Unnecessary and excessive food intake is used by many for comfort; some use food to relieve boredom or anxiety. Overweight people also tend to eat quickly and end up consuming more calories than needed.

**Hormonal factors:** Underactive thyroid could contribute to overweight. This and other medical conditions must be ruled out before embarking on the best course of action to achieve appropriate weight loss.

**Ecological perspective**

From ecological and public health standpoints, there are other factors that should also be considered. With the recent industrial growth, increasing urbanization and recent nutrition transition in many countries people are changing the way they live and eat. The increasing use of energy-dense foods and Westernization of the food supply are reasons for concern. Also, convenient city designs, transportation policies and technological advances create situations that discourage physical activity. Similar patterns are also being observed in other developing countries such as China and India.

As research increases our understanding of the causes of obesity, the recommendations concerning its prevention and control are beginning to converge.

*The final question concerning weight loss and management will be addressed in part three of this series.*

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