

OBESITY--HISTORY, ETIOLOGY AND COMPLICATIONS

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INTRODUCTION

Obesity is considered to be one of the major health problems of the United States (1). Bruch (2) indicated that the incidence of overweight and obesity in the United States has been estimated to be as high as 30 per cent or more. This high incidence has been called a national scandal (2). The roots of the problem of obesity are complex. Young (3) suggested that its causes may be biochemical, physiologic, sociologic, economic, cultural or psychologic. Regardless of the cause or causes, it is common knowledge that obesity carries certain risk factors: heart disease, hypertension, strokes, diabetes, gallbladder disease, gout, increased risk in surgery, hazards in pregnancy, arthritis, and cirrhosis of the liver. It is the purpose of this report to relate the findings of current research to the problems of obesity.

HISTORY OF OBESITY

Concern about the problem of obesity is not new. There is evidence the ancient Greeks sought a solution (2). They envied the Cretans for having known of a drug that permitted them to stay slim while eating as much as they wanted. The Spartans were stern and punitive in their attitude toward obesity. Young people were examined in the nude once a month and those who had gained extra weight were forced to exercise to keep from becoming fat. The Athenians also frowned upon overweight.

Obesity was considered fashionable by many cultures in the past. In fact, overweight was considered a sign of health and even beauty. In lands where food was sometimes scarce and famine often has been a reality, overweight was an indication of affluence. At another point in history,

corpulence, as obesity was called, was considered to be a sign of aging. If corpulence occurred before the age of thirty, the process of aging was considered to have begun in the individual.

Hermann Senator, speaking to various medical groups in Europe in 1903, contended that the glands responsible for internal secretions controlled the processes of oxidation and the diseases of metabolism, one of which was obesity (4). He believed obesity to be a direct consequence of alterations in the glands.

OBESITY DEFINED

An exact definition of obesity is often lacking in articles dealing with the subject (5). Generally, overweight is considered to be 10 to 20 per cent over the normal weight; any person who is more than 20 per cent over normal weight is considered to be obese. The question arises, however, what is normal weight? In 1963 in Sweden at a symposium on overnutrition, a great deal of discussion centered on the ideal weight (2). Objections were voiced to arbitrary standards that demand that everyone's weight conform to that of a 30-year-old American. Using this standard in the survey in South Sweden, it was discovered that 70 per cent of the female population were 10 kg or more overweight and 10 per cent were 30 kg or more overweight. However, there was nothing to indicate these large numbers of "overweight" people suffered complications because of being overweight (2).

Insurance companies have long sought to motivate policy holders to maintain reasonably healthy weights. The height-weight tables devised by these companies have been widely accepted as a standard guide to healthy weights for a given height, body frame, age, and sex. Table 1 presents a representative insurance company height-weight table. Recently the validity of height-weight tables as a

**THIS BOOK
CONTAINS
NUMEROUS PAGES
WITH DIAGRAMS
THAT ARE CROOKED
COMPARED TO THE
REST OF THE
INFORMATION ON
THE PAGE.**

**THIS IS AS
RECEIVED FROM
CUSTOMER.**

	Height	Weight in Pounds (in Indoor Clothing)		
	(in Shoes)	Small Frame	Medium Frame	Large Frame
Men	5' 2"	112-120	118-129	126-141
	3"	115-123	121-133	129-144
	4"	118-126	124-136	132-148
	5"	121-129	127-139	135-152
	6"	124-133	130-143	138-156
	7"	128-137	134-147	142-161
	8"	132-141	138-152	147-166
	9"	136-145	142-156	151-170
	10"	140-150	146-160	155-174
	11"	144-154	150-165	159-179
	6' 0"	148-158	154-170	164-184
	1"	152-162	158-175	168-189
	2"	156-167	162-180	173-194
	3"	160-171	167-185	178-199
	4"	164-175	172-190	182-204
Women	4' 10"	92- 98	96-107	104-119
	11"	94-101	98-110	106-122
	5' 0"	96-104	101-113	109-125
	1"	99-107	104-116	112-128
	2"	102-110	107-119	115-131
	3"	105-113	110-122	118-134
	4"	108-116	113-126	121-138
	5"	111-119	116-130	125-142
	6"	114-123	120-135	129-146
	7"	118-127	124-139	133-150
	8"	122-131	128-143	137-154
	9"	126-135	132-147	141-158
	10"	130-140	136-151	145-163
	11"	134-144	140-155	149-168
	6' 0"	138-148	144-159	153-173

Table 1 - Desirable Weights for Men and Women
of Age 25 and Over (7)

Reproduced by permission of the Metropolitan Life Insurance Company. Data are based on weights associated with lowest mortality. To obtain weight for adults younger than 25, subtract one pound for each year under 25.

standard has been questioned. Bruch (2) indicated that it is generally considered more accurate to estimate fatness by making a couple of judicious pinches of the skinfolds than to compare the weight of a moderately overweight person to the height-weight tables. Mayer (6) questioned diagnosis of obesity and prescription of ideal weight for a given patient based on height-weight tables.

MEASUREMENTS FOR DETERMINING OBESITY

Unscientific. In our daily assessment of individuals there are many unscientific methods employed to determine overweight. One means of measuring is the eyeball test: if a person looks fat, he is fat (8). There is also the pinch test: the layer of fat beneath the skin at many locations on the body--such as the back of the upper arm, or the side of the lower chest, the back of the calf or the abdomen--when pinched should not be more than one-fourth to one inch thick (9). A fold, including a double thickness of skin, should not exceed one inch in any one of these areas. If it does, excessive body fat is indicated.

Scientific. Scientific methods for determining overweight include the densimetric test, body potassium evaluation, and anthropometric measures. The densimetric test is a method of testing based on the low specific gravity of adipose tissue. By determining the density of the individual under water, and making corrections for air in the lungs, it is possible--through formulas--to determine the amount of fat in the body. Mayer (6) said that Welham and Behnke's densimetric study indicated that overweight and obesity are not synonymous terms. These scientists measured the specific gravity of seventeen professional football players who had greater than average specific gravity yet proved to have low fat content. The insurance company height-weight tables would list these men as

obese.

Since body cells contain potassium and fat contains none, it is possible to discover the amount of body fat by determining the amount of potassium in the body. Gamma rays are counted as they are being emitted by the radioactive isotope of potassium which accompanies the nonradioactive potassium of the body in small and constant proportions. Body fat can then be specifically determined: the greater the amount of potassium in relation to the total size of the body, the smaller the amount of fat (9).

One final scientific method used to determine fat content is anthropometric measures. This is a procedure in which calipers are used to measure skin folds. It is considered the most practical of the scientific methods (2, 6). This is a scientific refinement of the pinch test. An individual less than 30 years old whose triceps skin fold is greater than one standard deviation from the mean should be considered obese. By this method Mayer (6) determined that 16 per cent of the American population less than 30 years of age are obese. Table 2 indicates the standards for obesity as defined by Mayer (6).

ETIOLOGY OF OBESITY

In 1904, Lorand (4) presented a paper on two kinds of obesity to the French Congress of Internal Medicine in Paris. It was his contention that obesity is either exogenous or endogenous. Exogenous obesity is caused by the food we eat. Endogenous obesity is caused by changes in the functioning of cellular glands such as the thyroid gland, pituitary gland and sex glands. He cited cases, for example, in which severe obesity followed injury to or tumor of the pituitary gland (4).

Saffer and Barber (10) believe that obese patients are among the most difficult, exasperated and self-destructive of all patients. They have discovered that

Age (Years)	Minimum Triceps, Skin Fold Thickness Indicating Obesity (Millimeters)	
	Males	Females
5	12	14
6	12	15
7	13	16
8	14	17
9	15	18
10	16	20
11	17	21
12	18	22
13	18	23
14	17	23
15	16	24
16	15	25
17	14	26
18	15	27
19	15	27
20	16	28
21	17	28
22	18	28
23	18	28
24	19	28
25	20	29
26	20	29
27	21	29
28	22	29
29	22	29
30-50	23	30

Table 2

Obesity Standards in Caucasian Americans (6)

treatment for obesity is often difficult. In trying to determine why this was so, they postulated a number of theories.

It is apparent that overeating is the immediate cause of all types of obesity, but that this is invariably the primary cause is less certain. More probably what matters, at least in some types, is the degree of efficiency with which the mechanisms that regulate the weight of the body are functioning.

One theory holds that since eating was the main activity in infancy, unnecessary snacking and overeating is an attempt to escape the pressures of reality and return to a less complicated existence (10). Another theory is that obesity results from a ferociousness to food that suggests cannibalism. It has been theorized that obesity results from sexual inhibition and consequently the obese individual is inept in mature sexual expression; such a person eats to relieve tension and depression.

Saffer and Barber (10) found that some obese men had difficulty in knowing exactly when they were hungry. Physical inactivity often accompanied excessive food intake. They observed that obese people ate in response to external cues rather than internal cues such as blood sugar level and gastric motility. The obese who ate just prior to grocery shopping purchased more than the nonobese who went shopping without prior eating. Treatment of obesity must deal with the causes of these external cues.

QQF Theory. The traditional method for treatment of obesity has been caloric restriction. It has been noted that caloric restriction will cause a decline in energy expenditure. If more fat is to be lost as energy, then the energy expenditure must be increased. Since lean tissues oxidize free fatty acids as a primary energy source, diets that cause loss of lean tissue will decrease the body's capacity to oxidize and lose fat. Perhaps, then, restriction

of calories may be contraindicated in the treatment of obesity (11). The QOF theory postulated by Schauf (11), promotes the idea that the quantity and the quality of food, as well as the frequency of ingestion, are important factors in the etiology of obesity. The proportion of protein, fat and carbohydrate that make up the diet is a crucial factor in determining what becomes of the ingested food; this proportion is the determining factor which will decide whether the food will be stored as fat or synthesized into lean tissue. When the entire calorie ration is consumed in one small time segment by rats, the ceiling capacity of the liver to store glycogen is exceeded. Within a few hours after one large meal, the glycogen stored in the liver is depleted. In order to maintain serum glucose levels, protein, rather than fat, is converted to glucose through the process of gluconeogenesis in the liver. The rats gained in fat while losing lean muscle tissue. Since there is little net conversion of fat to glucose in mammalian species, Schauf (11) contended the frequency of meals ingested is extremely important in the etiology of obesity.

Another aspect pertaining to the QOF Theory (11) is the quality of food ingested. Sucrose, a common source of carbohydrate, appears to be a critical factor in regulating the degree of obesity. This is true because alpha-glycerophosphate, a glucose metabolite, is essential for the storage of triglyceride in the fat cell. A study of college students showed that weight loss, fat loss, and percentage loss as fat are inversely proportional to the amount of carbohydrate in the diet. Further oxidation and loss of stored body fat will result in an increased metabolic rate because ingested fatty acids are not esterified by alpha-glycerophosphate and stored as triglyceride, but instead may be bound to albumin and carried to the muscles to be used as energy (11).

Genetic factors. Both Stare (12) and Martin (13)

stated that obesity is a disease that is transmitted genetically. Other nutritionists believe there is not sufficient evidence to support the theory that genetic factors are involved (14, 15). In one study (10) 73 per cent of over one thousand obese patients had one or both parents obese.

Socioeconomic factors. Coupled with genetic factors are the cultural factors passed on from parents to children. Stare (12) suggested the following can lead to obesity: ignorance of caloric values and the relationship of energy needs to energy intake and output, faulty family eating patterns that are top heavy in calories, and food used as comfort or diversion when worried, frustrated or unhappy. Low income and lack of availability of proper foods for adequate diet are factors in obesity.

Set-Point Theory. Itallie (16) stated a concept that he is reluctant to believe, but one that has been proposed, called the "Set-Point Theory." It is the contention of this theory's proponents that the obese person's ponderostat, analogous to a thermostat, is set too high. These people reduce only to regain lost weight in a short time.

"Fat babies become fat adults." There is little evidence to support the theory that fat babies become fat adults. Heald (8) suggested that this occurred only in a few instances and more recent evidence suggested that obese newborn infants were children of chemically or overtly diabetic mothers. Others have stated there are two periods of juvenile onset of obesity: one between birth and 4 years and the other between 7 and 11 years.

Overnutrition in infants is being promoted by the preponderance of mothers who choose to feed their infants formula rather than breast feeding. Lactation provides a

limited quantity of milk (17). There is a tendency to explain obesity in childhood as being the product of over-nutrition during infancy resulting in an excess number of adipose cells, thus predisposing an individual to obese tendencies in later life (2). Shukla et al. (18) stated the size and number of fat cells are increased in adults and older children who were obese by the age of 1 year.

In one group of obese adults studied, one third had a history of juvenile-onset obesity. This type of obesity was more severe and more difficult to treat than adult-onset obesity (12). Hueneman (19) found that body weight gains during the early months of life may lead to obesity in later life. Infants who gained rapidly in the first 6 months of life were likely to be obese by 6 to 8 years of age.

Ten to forty per cent of elementary and high school students tend to be obese. The proportion increases with age. Twenty per cent of boys and girls graduating from high school are too fat and the proportion has increased fifteen to twenty per cent in the last fifteen years (13). It appears our society provides many opportunities for eating and so few for exercising, consequently these factors contribute to an obese population (20).

Regulatory and metabolic theory. An additional classification of obesities relates to the actual mechanism within the individual--regulatory and metabolic obesity. The primary malfunction in regulatory obesity is in the central mechanism regulating food intake (15). Hypothalamic obesities have been induced in animals by surgery or gold thioglucose, by thalamic or frontal lesions, and by forced overeating. In humans this type of obesity is likened to that created by immobilization or severe sedantarianism. In metabolic obesity, overeating is due to a malfunction in the metabolism of fats and carbohydrates (2, 14).

Psychological factors. Obesity in adults may be

caused by crisis experiences encountered during juvenile and adolescent years. Berland (21) stated that a strong, emotionally shocking experience during adolescence may affect one as an adult many years later. He indicated that women who have had cruel introductions to sexual intercourse at an early age may be prime targets for obesity. His study showed that such girls were affected the rest of their lives through poor school grades and difficulty in keeping jobs because of poor performance even though they may have superior I.Q.'s. These girls demonstrated a tendency to avoid friendship, human contact, love, and sex, and in its place they seek food; thus they often become obese.

Body types. Body types have been categorized into three somatypes. Seltzer and Mayer (22) showed that obesity does not occur in all varieties of physical types. The three somatypes are ectomorphs, mesomorphs, and endomorphs. Ectomorphs are defined as slight in frame with long arms and legs and fine bones. Mesomorphs are defined as heavy in bone and muscle, athletic in appearance and having medium length limbs. The endomorphs are defined as being round and soft in body, particularly around the abdominal area (7). Obese adolescent girls were shown to be more endomorphic, somewhat more mesomorphic, and considerably less ectomorphic than normal weight girls. Endomorphy predisposes to the laying on of fat unless insufficient diet, excessive activity, disease, or voluntary weight control intervenes.

Linton et al. (23) studied characteristics present in the obese and absent in normal weight individuals. They contended that obese persons gain a greater level of satisfaction or tension reduction from eating than does the normal weight person. The obese person requires a longer period to reach a satiety point. In the Linton et al. (23) study, subjects were tested by being shown pictures that might stimulate eating and were provided snack foods. The fat persons recognized 28 stimuli per session, thin people

recognized 20; fat people ate six times, thin people ate four times in response to the stimuli.

COMPLICATIONS OF OBESITY

Hypertension. Heald (8) indicated that prevalence of hypertension in all ages increased with weight. Sixty per cent of obese patients who lost weight became normotensive. Obese patients with hypertension show a greater morbidity and mortality rate and are greater coronary heart disease risks.

The mechanism of the association between obesity and hypertension is not known. However, it is known that obesity increases O_2 consumption at rest and increases work when moving and thus increases cardiac output and peripheral resistance. This forces greater left ventricular work. The synergistic increase of the work of the heart is obviously dangerous and explains why the combined risk factor of the two conditions--obesity and hypertension--presented simultaneously may be greater than the sum of the risks due to each condition. These patients may be unable to respond to the increased cardiac output demanded by obesity without increasing their blood pressure. The importance of weight reduction in this type of patient is obvious (24).

Pickwickian syndrome. Obesity may lead to the Pickwickian syndrome (6), a respiratory condition in which an accumulation of carbon dioxide in the blood leads to lethargy and somnolence due to decreased ventilation. Lowered oxygenation of arterial blood may also lead to reactive polythemia which increases the possibility of thrombosis and abnormal blood clotting. Cardiac enlargement and congestive heart failure may result from pulmonary difficulties due to extreme obesity.

Severe obesity was the cause of a 43-year-old white male's unpreventable sleeping at inappropriate times and

places (25). His normal night's rest was disturbed due to intermittent obstruction of the upper airways because of obesity leading to hypoventilation.

Infertility. Infertility in obese men may be the result of excessively high temperature of the scrotum caused by excessive folds of adipose tissue (6). The excessive adipose tissue causes the testicles to react at higher than normal temperature; consequently the sperm will not be fertile (6).

Surgical risks. Obese patients who need surgery have increased risks (6). Even with improved techniques, anesthesia is more dangerous because of the fat layers and stretched tissue with which the surgeon must contend.

Birth complications. Stillbirths, toxemia and complications are more prevalent in obese pregnant women (14). Management of weight gain is delicate in the obese pregnant women because their diet needs to be adequate nutritionally but restricted in calories. Weight reduction should not be attempted during pregnancy.

Diabetes. The Framingham study showed overweight people developed diabetes three times as often as the non-overweight (8). Adults who gained an excessive amount of weight after age 25 had a twofold increase in risk of developing diabetes. The diabetic was discovered to be a risk for lethal coronary heart disease and stroke; there was even greater risk for the obese diabetic. Atherosclerosis, a particular kind of circulatory disorder, is common in diabetes. People with atherosclerosis are hypertensive and most cases are likely to be obese. Howell and Loeb (26) reported that weight reduction often results in marked improvement in diabetes.

A correlation between adiposity and glucose

intolerance exists for some obese. Glucose tolerance is frequently impaired in the obese, but reverts to normal if significant weight is lost. This may reflect overwhelming insulin resistance in the obese state and the development of a pseudodiabetic state (27). Even though obese persons have high insulin levels, their bodies have peculiarities that prevent insulin from doing its work (15).

Weight reduction is often the treatment for hyperglycemia as well. Often after weight reduction, there is no indication of a need for insulin. Weight reduction also prevents skin and other infections related to hyperglycemia and avoids the risks of acidosis (6).

Diabetes is probably a heterogeneous collection of entities--obesity being one of them. The degree of abnormality of hyperplasia of the islets of Langerhans in the pancreas, increased insulin secretion, and glucose tolerance found in obese patients seems to correlate better with the duration rather than the magnitude of obesity (28). It is more likely, then, for a person who has been overweight for a long period to have an abnormality in glucose than a person of the same weight who gained weight recently.

Heat loss factor. A lesser complication of obesity is the restriction of normal heat loss and promotion of excessive perspiration. In extremely obese persons, friction between skin folds leads to rashes, inflammations, and furuncles (6).

Blood cholesterol. Abnormally high values of blood levels of cholesterol, triglycerides and free fatty acids have been reported in the obese (28, 29). Leaf (30) studied inhabitants of the Andean village of Vilcabamba in Ecuador, the Hunza in the Karakoram Range in Pakistani-controlled Kashmir and the Abkhazia in the Georgian Soviet Socialist Republic in the southern Soviet Union. All of these people are alleged to live much longer and remain more

vigorous in old age than in most modern societies. He found low animal fat, low cholesterol and low calorie diets in two of the three areas. In the Caucasus, he found the old people consumed 1700 to 1900 calories per day. He found old people generally quite slim and whether slim or not, all their cultures shared a great deal of physical activity.

If man were to control his diet carefully and exercise to avoid obesity, he could increase his life span by five years. Mayer (6) stated that the relationship between obesity and degenerative diseases is such that obesity should be prevented in preparation for a successful old age.

Osteoarthritis. Leach et al. (31) found a correlation between osteoarthritis of the knee and obesity. The weight an obese patient bears on the knee when walking is considerable and contributes to the wear and tear of that particular joint. In ordinary walking, the force delivered to the tibial plateaus at the time of heel strike is approximately three times the body weight. A 130-pound woman walking 8000 steps per day would deliver 3,120,000 pounds of force to the tibial plateaus in contrast to an overweight woman of 200 pounds delivering 4,800,000 pounds to the tibial plateaus.

Gallbladder disease. Recent research supports the evidence that there is a correlation between obesity and gallbladder disease. However, there is no concrete evidence suggesting that weight reduction lessens the risk for gallbladder disease (32-34).

Strokes. The incidence of strokes seems to be related to that of heart problems; both are affected by high blood pressure. The risk is present because of the high incidence of high blood pressure which most often accompanies obesity (35).

CONTRAINDICATIONS FOR WEIGHT REDUCTION

There have been a few contraindications for weight loss (10). Weight reduction is contraindicated in Addison's disease, regional ileitis, and ulcerative colitis; however, these are diseases that are rarely associated with obesity. It has also been contraindicated for gout and tuberculosis in the past; however, recently it has been found that weight reduction will not adversely affect these diseases.

There is also a potential danger associated with weight reduction of patients who have circulatory problems. If they cannot maintain the lower weight, there is risk in regaining the lost weight as it places a very damaging burden on the circulatory system (2).

It has been found in some cases that people believed they weighed too much and consequently shed those extra pounds. After losing and unintentionally regaining their former weight, these individuals discovered they felt better and functioned more efficiently at the increased weight (2).

SOCIAL ASPECTS RELATING TO OBESITY

It has been suggested that the short, fat and ugly do not get jobs. It has been suggested that education beyond high school is associated with lower weight (9). Obese adults may have a pathologically bad concept of their body image which affects their ability to function normally as healthy adults (3).

It appears that overweight college applicants have been unconsciously discriminated against through teacher recommendations and college interviews. Obese students have a harder time getting into college than people with normal weights. Girls are more affected than boys. However, no correlation between intelligence and weight has been found.

A study in New York City showed that obesity was seven times higher among women reared in the lowest

socio-economic category contrasted to those in the highest (3). One reason could be that carbohydrate foods are cheaper and more available than the more expensive protein, fruits, and vegetables. Bray (36) stated it would be more effective to manipulate the social environment to decrease the incidence of obesity than to change the composition of a particular diet.

Since ours is a society that disapproves of overweight, psychological problems do arise. It may be frustrations from unsuccessful efforts at weight reduction--especially in the social pressure that arises among teenage girls (13).

OBESITY IN RELATION TO AGING

It has been said that one can eat what he wants until age 40; after that one needs to plan his diet more carefully. However, Wrench (37) believes the diet that contributes to the longevity of the Hunzas must be followed all through life. The availability of the right diet must prevail from the beginning of life.

Leaf (30), too, stated that diet was important for longevity and a diet low in animal fat, cholesterol and calories was necessary to achieve longevity. He found that the Hunzas expect to live to be 100 years and they believe youth does not end until about 80 years. In the United States we may have programmed our lives to a shorter existence of about 80 years.

Obesity, from all indications, is a hazard to the aging. Researchers find that maintenance of desirable weight increases one's life span (38). If food has been used to comfort as one grew up, it becomes more and more necessary in the aging when more and more losses are a part of life (39).

SUMMARY

Obesity is one of the major health problems of the United States. For several decades the insurance companies' height-weight tables provided the most widely used standard for determining deviations from healthy weight norms. More recently, methods have been developed for determining body fat. The most practical method consists of a caliper measurement of skinfold thickness at several points on the body.

A study of the etiology of obesity indicates a complex array of causes such as overeating, proportion of protein, fat and carbohydrate in the diet, genetics and environmental and socioeconomic factors. A correlation between an infant's diet and weight and his weight in later life has been observed. Regulatory and metabolic endogenous causes which suggest a glandular malfunction or imbalance may affect the mechanism regulating food intake. Psychological maladjustments to life also may lead to overeating and obesity. One's innate body type--endomorph, ectomorph or mesomorph--determines tendencies toward or away from obesity.

Obesity triggers many health complications such as hypertension, Pickwickian syndrome, infertility in men, increased surgical risk, toxemia and complications of birth for pregnant women, abnormally high values of blood cholesterol, triglycerides, and free fatty acids and gallbladder disease. However, there are also a few contraindications for weight reduction such as Addison's disease, regional ileitis, ulcerative colitis and circulatory problems. Obesity may create problems of social interaction. The obese are often discriminated against in the job market and in other areas of society where they must compete with the nonobese. Longevity of life and freedom from obesity are complementary because many of the complications of obesity are avoided by the nonobese.

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OBESITY--HISTORY, ETIOLOGY AND COMPLICATIONS

by

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Obesity is one of the major health problems of the United States. For several decades the insurance companies' height-weight tables provided the most widely used standard for determining deviations from healthy weight norms. More recently, methods have been developed for determining body fat. The most practical method consists of a caliper measurement of skinfold thickness at several points on the body.

A study of the etiology of obesity indicates a complex array of causes such as overeating, proportion of protein, fat and carbohydrate in the diet, genetics and environmental and socioeconomic factors. A correlation between an infant's diet and weight and his weight in later life has been observed. Regulatory and metabolic endogenous causes which suggest a glandular malfunction or imbalance may affect the mechanism regulating food intake. Psychological maladjustments to life also may lead to overeating and obesity. One's innate body type--endomorphie, ectomorphic or mesomorphic--determines tendencies toward or away from obesity.

Obesity triggers many health complications such as hypertension, Pickwickian syndrome, infertility in men, increased surgical risk, toxemia and complications of birth for pregnant women, abnormally high values of blood cholesterol, triglycerides, and free fatty acids and gall-bladder disease. However, there are also a few contraindications for weight reduction such as Addison's disease, regional ileitis, ulcerative colitis and circulatory problems. Obesity may create problems of social interaction. The obese are often discriminated against in the job market and in other areas of society where they must compete with the nonobese. Longevity of life and freedom from obesity are complementary because many of the complications of obesity are avoided by the nonobese.