

Overweight in the Aged

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OBESITY has been implicated as a health hazard in many studies. It is almost universally accepted as important in permitting the expression of diabetes mellitus, frequently assumed to be a causal factor in atherosclerosis, and an aggravating factor in various forms of arthritis, hypertension, and other diseases. The idea that obesity is a health hazard gained major support from studies by Dublin and Marks¹ on the mortality experience of insurance companies with overweight individuals. These writers reported an aggregate mortality of 150 per cent in overweight people as compared with policy holders of average weight for height.

Keys² has criticized these studies as failing to separate those over average weight with increased body fat from those with increased non-fat tissue and has questioned whether the insured overweight group is representative of the overweight population.

Armstrong *et al.*³ have reported that 7 per cent of the population from age 25 through 59 years is 20 per cent or more heavier than the average weight for their height. The average weight for height tables on which these studies are based show a gradual increase in weight for

men and women from 25 to 59 years of age.

The implication of these data and the lack of information on average weight in older persons prompted this study of body weight on some 700 people over age 65.

MATERIAL AND METHODS

The subjects studied attended either an outpatient clinic or were residents in domiciliary institutions for elderly people in Virginia. Less than 10 per cent were Negroes. All subjects were ambulatory and those with debilitating chronic disease or recent acute changes in weight were eliminated from the study. Each subject's height and weight, with shoes and ordinary indoor clothing on, were measured. A careful weight history was recorded. The weight history included attempts to get known maximum and minimum weights and to date these by the age at which the patient finished school, married, entered military service or experienced other important personal events. This information checked against the few available records seemed reasonably accurate for the group included in this report.

Data on 681 people, 474 males and 207 females, were sufficiently complete to permit analysis.

RESULTS

Since the number of subjects in this study is relatively small, the weights are given by decades for each two inches of height. The data on average weight for males are given in Table

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TABLE I
Average Weight for 474 Males by Decades and Heights
(Number of Subjects in Each Group is in Parentheses
Beside Each Average Weight)

| Heights in Inches | Weights According to Age Periods | | |
|-------------------------|----------------------------------|----------|---------|
| | 65-74 | 75-84 | 85-94 |
| 54-58 | 167 (4) | 138 (2) | |
| 59-60 | 119 (4) | 200 (1) | |
| 61-62 | 135 (28) | 134 (7) | |
| 63-64 | 143 (36) | 146 (10) | 136 (6) |
| 65-66 | 152 (90) | 151 (35) | 140 (8) |
| 67-68 | 161 (101) | 153 (31) | 153 (8) |
| 69-70 | 165 (60) | 163 (14) | 167 (5) |
| 71-72 | 180 (21) | 149 (4) | 153 (2) |
| 73-74 | 139 (3) | 173 (2) | |
| 75-76 | 217 (1) | | |

I and that for females in Table II.

The weight trends with increasing age for the more common heights are illustrated in Figure 1. The average weights for the ages 25 to 59 were taken from the average weight tables furnished by the Metropolitan Life Insurance Company. In these tables the increase in weight with each inch of height is rather constant within the range of several inches from age 25 to 59, so the weights in Figure 1 are average weights for each two inches of height.

The degree by which those overweight exceeded the average calculated for age and height in this study is given for males in Table

TABLE III
Percentage of Males Who Were 20 Per Cent or More
Above Average Weight by Decades

| Degree of Overweight | All Ages N:474 | Age 65-74 N:339 | Age 75-84 N:105 | Age 85-94 N:30 |
|---|-------------------|-----------------------|-----------------------|----------------------|
| 20%+ | 20 38.5% | 12 32.4% | 7 50.0% | 1 |
| 30%+ | 21 40.4% | 16 43.3% | 5 35.8% | |
| 40%+ | 6 11.5% | 5 13.5% | 1 7.1% | |
| 50%+ | 5 9.6% | 4 10.8% | 1 7.1% | |
| Total 20% or more above average weight | 52 10.9% | 37 10.9% | 14 13.3% | 1 3.3% |

TABLE II
Average Weight for 207 Females by Decades and
Heights (Number of Subjects in Each Group Given in
Parentheses Beside Each Average Weight)

| Heights in Inches | Weights According to Age Periods | | |
|-------------------------|----------------------------------|----------|---------|
| | 65-74 | 75-84 | 85-94 |
| 54-58 | 126 (5) | 115 (8) | 99 (5) |
| 59-60 | 136 (15) | 127 (29) | 127 (9) |
| 61-62 | 132 (27) | 127 (26) | 121 (9) |
| 63-64 | 143 (17) | 137 (28) | 127 (7) |
| 65-66 | 146 (11) | 134 (9) | 131 (4) |
| 67-68 | 157 (2) | 170 (1) | - |
| 69-70 | - | - | - |

III and for females in Table IV. Weight histories on this group indicate that 48.4 per cent of the females and 21.1 per cent of the males reached this overweight category after age 60. For those within 20 per cent of the average weight at the time of study, it appeared by history that 30.9 per cent of females and 25.5 per cent of the males had been 20 per cent or more above average weight at some period in their lives. Tables V and VI give the percentage by which those formerly 20 per cent or more overweight exceeded the average for the age at which their weights were highest.

Since from Figure 1 maximum average weight appears to occur around 55 to 59 years, the percentage of subjects who were greater than 20 per cent of this weight was determined; 10.9 per cent of males and 8.2 per cent of fe-

TABLE IV
Percentage of Females Who Were 20 Per Cent or More
Above Average Weight by Decades

| Degree of Overweight | All Ages N:207 | Age 65-74 N:76 | Age 75-84 N:99 | Age 85-94 N:32 |
|---|-------------------|----------------------|----------------------|----------------------|
| 20%+ | 13 39.4% | 3 25.0% | 9 56.3% | 1 20.0% |
| 30%+ | 12 36.4% | 5 41.7% | 5 31.2% | 2 40.0% |
| 40%+ | 8 24.2% | 4 33.3% | 2 12.5% | 2 40.0% |
| 50%+ | - | - | - | - |
| Total 20% or more above average weight | 33 15.9% | 12 15.7% | 16 16.1% | 5 15.6% |

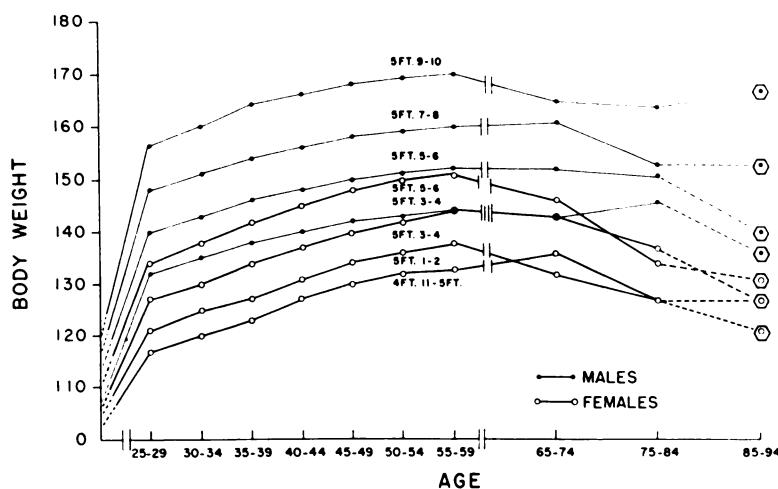


Fig. 1. Average weights for age for males and females. Average weights from 25 to 59 years compiled from the average weight tables of the Metropolitan Life Insurance Company. Average weights for the 65- to 94-year group compiled from the group studied. Weights given for age 85 to 94 are the averages from less than ten subjects.

males were 20 per cent or more heavier than the average weight of the 55 to 59-year group in the standard weight tables.

DISCUSSION

The number of subjects included in this study is too small to permit great accuracy in establishing average weight for older people. However, the data are probably adequate to indicate certain trends. The weight curves in Figure 1 suggest that the gradual increase in average weight which occurs from age 25 to 59 has stopped by the 65-to-74 decade and that average weight tends to plateau during that period. After that decade the evidence appears to be that average weight tends to decline

and is roughly that of the average of the weights at age 25 to 29, for both men and women during the 85 to 94 decade.

The finding that 30.9 per cent of females and 25.5 per cent of males, who were within 20 per cent of the average weight at the time of the study, had been overweight at some period in their lives is surprising. The accuracy of retrospective studies of this type are always in doubt; however, allowing for a very large error, this information would suggest that the group surviving to old age contains a large number of people who have been overweight.

Mortality studies¹ of overweight people who reduced their weights to within the limit acceptable for standard insurance show that weight

TABLE V

Incidence and Degree of Excessive Weight in Males Who Were Within 20 Per Cent of the Average Weight at the Time of the Study but Who Had at Sometime Exceeded the Average Weight by 20 Per Cent or More

| Degree of Overweight | All Ages N=474 | | Age 65-74 N=339 | | Age 75-84 N=105 | | Age 85-94 N=30 | |
|---|-------------------|-------|-----------------------|-------|-----------------------|-------|----------------------|-------|
| 20%+ | 41 | 33.9% | 27 | 38.1% | 9 | 25.7% | 5 | 33.3% |
| 30%+ | 48 | 39.7% | 30 | 42.2% | 13 | 37.1% | 5 | 33.3% |
| 40%+ | 20 | 16.5% | 6 | 8.5% | 9 | 25.7% | 5 | 33.3% |
| 50%+ | 12 | 9.9% | 8 | 11.2% | 4 | 11.5% | - | - |
| Total Formerly 20% or more above average weight | 121 | 25.3% | 71 | 20.9% | 35 | 33.3% | 15 | 50.0% |

TABLE VI

Incidence and Degree of Excessive Weight in Females Who Were Within 20 Per Cent of the Average Weight at the Time of the Study but Who Had at Sometime Exceeded the Average Weight by 20 Per Cent or More

| Degree of Overweight | All Ages N=207 | | Age 65-74 N=76 | | Age 75-84 N=99 | | Age 85-94 N=32 | |
|---|-------------------|-------|----------------------|-------|----------------------|-------|----------------------|-------|
| 20%+ | 15 | 23.4% | 3 | 13.1% | 5 | 18.5% | 7 | 50.0% |
| 30%+ | 29 | 45.3% | 12 | 52.1% | 13 | 48.1% | 4 | 28.0% |
| 40%+ | 8 | 12.5% | 2 | 8.8% | 5 | 18.5% | 1 | 7.1% |
| 50%+ | 12 | 18.8% | 6 | 26.0% | 4 | 14.9% | 2 | 14.3% |
| Total Formerly 20% or more above average weight | 64 | 30.9% | 23 | 30.2% | 27 | 27.2% | 14 | 43.7% |

This One



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reduction results in significant improvement in mortality for this group. Few in the group studied here reported any serious attempts at weight reduction. For the most part, weight reduction in the group of former overweights appeared to be the result of natural or unplanned variations in weight. Certainly it would seem that the incidence of excessive weight would be much higher if calculated on highest lifetime weight rather than the incidence of excessive weight at one time in any segment of the population. Little is known of the effects of major weight shifts over a period of years. Pomeranze⁵ has suggested that the "wear and tear" of repeated major shifts in weight may result in "failure of a predisposed organ."

The number of people who were 20 per cent or greater than the average weight for age at the time of the study given in Tables III and IV is higher than the 7 per cent in the general population. However, historically, it appears that 21 per cent of the males and 48 per cent of females in this group reached a weight of 20 per cent or more over the average after age 60. This might be the result of weight gain for some individuals or the result of the declining average with age. The number of males with weights 20 per cent or more above average was the same, 10.9 per cent vs. 10.9 per cent, whether the calculated averages for the older ages or the averages of the 55- to 59-year period were used. Analysis of the individual cases showed that only five individuals shifted groups when the two different averages were used as standards for comparison. Only 8.2 per cent of the females were 20 per cent or more above the average weight for 55 to 59 years, while 15.9 per cent were this much above the average calculated for the older age group. The changes in this group were largely due to maintenance of a weight which became 20 per cent or more above the average as the average decreased fairly sharply with advancing age. This change in average weight is illustrated in Figure 1. These studies indicate that the percentage of people who are 20 per cent or more overweight after age 65 is at least equal to that of overweight people in the general population. One would not expect to find this many over-

weight people over 65, using the mortality experience of insurance companies with overweight people as a guide.

Average body weight seems to plateau at the 65 to 74 decade, being roughly that of the 55- to 59-year group. After the 65 to 74 decade, the average weight decreases and the decrease is more abrupt for females than for males. Historically, many of the people who are within 20 per cent of the average weight for age after age 65 were at some time 20 per cent or more above the average weight for age. As far as obesity is concerned, the implication of these studies is that the incidence of obesity in older people is as great or greater than the younger people. Keys⁴ has demonstrated that inactive people are fatter than more active people of the same weight. Certainly, the subjects of this study were relatively inactive and it seems reasonable to assume that those who were overweight would have a higher body fat content than a younger and more vigorous group with the same average weights.

SUMMARY

A study of body weight on some 700 people over age 65 revealed that 11.0 per cent of males and 15.9 per cent of females were 20 per cent or more above the average weight for their heights and age. Of subjects 65 years or older 10.9 per cent of males and 8.2 per cent of females were 20 per cent or more heavier than the average weight of the 55- to 59-year-old group as presented in the average weight tables used by insurance companies. The percentage of people who are 20 per cent or more above average weight after age 65 is at least equal to that of the general population. Average weight for people in this older group tended to plateau at the 65- to 74-decade and fall thereafter. Weight histories indicated that for those within 20 per cent of average weight at the time of study, 30.9 per cent of the females and 25.5 per cent of the males had at some period exceeded the average weight by 20 per cent or more.

The data suggest that the incidence of obesity is as great or greater than among younger adults.



REFERENCES

1. DUBLIN, L. I. and MARKS, H. H.: Mortality among insured overweights in recent years. *Trans. Assoc. Life Insurance Med. Dir. Amer.* 60: 235, 1952.
2. KEYS, A.: Relative obesity and its health significance. *Diabetes* 4: 447, 1955.
3. ARMSTRONG, D. B., DUBLIN, L. I., WHEATLEY, G. M., and MARKS, H. H.: Obesity and its relation to health and disease. *J.A.M.A.* 147: 1007 1951.
4. KEYS, A.: Body composition and its change with age and diet; in *Weight Control*. (A collection of papers presented at the weight control colloquium.) Iowa State College Press, Ames, 1955, pp. 18-28.
5. POMERANZE, J.: Recurrent obesity. *New York J. Med.* 56: 3017, 1956.

