Death was associated with low and high body mass index in women and older men

Seccareccia F, Lanti M, Menotti A, et al and the RIFLE Research Group. *Role of body mass index in the prediction of all cause mortality in over 62 000 men and women. The Italian RIFLE Pooling Project. J Epidemiol Community Health* 1998 Jan;52:20-6.

Question

What is the relation between body mass index (BMI) and short term mortality in men and women?

Design

Population based study of 47 cohorts from 9 studies in the Italian Risk Factors and Life Expectancy (RIFLE) Pooling Project.

Setting

Italy.

Participants

63 036 participants (age range 20-69 y, 52% men) who were registered on electoral rolls or worked in large companies, had participated in RIFLE project studies, and lived in 13 of the 20 Italian regions.

Assessment of risk factors

Age, height, weight, systolic blood pressure, serum cholesterol concentration, and mean number of cigarettes smoked daily.

Main outcome measure

All cause mortality at 6 years follow up.

Main results

At 6 years follow up, death had occurred in 85 of 13 150 younger men (age range 20-44 y), 950 of 19 591 older men (age range 45-69 y), 37 of 13 827 younger women (age range 20-44 y), and 301 of 16 468 older women (age range 45-69 y). Univariate, age adjusted analyses showed that a U shaped relation existed between BMI and mortality for older men and all women (table). After adjustment for age, systolic blood pressure, serum cholesterol concentration, and the number of cigarettes smoked daily, the relation remained for older men ($p=0.03$), younger women ($p=0.04$), and older women ($p=0.01$). When smokers,

early deaths, or both groups were excluded from the analysis, the U shaped relation no longer existed for older men but remained for all women. The BMI value that was associated with the minimum risk for mortality was 29 kg/m² (95% CI 22 to 36 kg/m²) for older men, 27 kg/m² (CI 24 to 30 kg/m²) for younger women, and 32 kg/m² (CI 26 to 38 kg/m²) for older women. Multivariate linear analyses, including BMI as a categorical variable, showed that an increased risk for death was seen in older men with a BMI <20 kg/m² (hazard ratio [HR] 1.62, CI 1.10 to 2.38); in younger women with a BMI ≥35 kg/m² (HR 4.42, CI 1.28 to 15.28); in older women with a BMI <20 kg/m² (HR 2.47, CI 1.39 to 4.37); and in older women with a BMI of 20-24 kg/m² (HR 1.50, CI 1.05 to 2.14).

Conclusion

For men who were 45-69 years of age and for women who were 20-69 years of age, all cause mortality was associated with low and high body mass index.

Age adjusted, all cause death rates (per 1000) at 6 years follow up

Patient groups	Body mass index group (kg/m ²)				
	<20	20-24	25-29	30-34	≥35
Men aged 20-44 y	4.7	6.8	6.6	3.4	7.2
Men aged 45-69 y	51.5	52.6	44.5	50.9	64.4
Women aged 20-44 y	4.0	2.4	2.3	2.5	11.6
Women aged 45-69 y	19.7	20.9	18.2	14.4	22.5

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Commentary

Concern exists about obesity as a health hazard, but little consistency is found in study methods. This leads to different recommendations regarding healthy BMI or body weight.^{1 2} The study by Seccareccia *et al* adds to the confusing array of findings associated with obesity research.

This study shows the U shaped curve finding of highest mortality rates at both ends of the BMI continuum (BMI <20 kg/m² and ≥35 kg/m²). This finding was seen in older men and women even after controlling for smoking, heart disease, and early deaths. It was not seen in younger men.

Several possible reasons may explain the different findings in the literature. Some researchers use different calculations of reference points for men and women. "Ideal" North American weight to height ratios were derived from a consen-

sus conference; the cultural value of leanness, particularly among women, cannot be underestimated and it may have influenced decision making at the conference. Current research shows the adverse effects of yo-yo dieting.³ Whether the participants in the current study engaged in this practice is unknown.

The strengths of this study are consistency of data collection for all participants, actual weighing and measuring of participants (rather than using self reports), use of an identical calculation of BMI for both men and women, and measurement of potential confounders such as systolic blood pressure and serum cholesterol concentrations. Despite the fact that this study was conducted only in Italy with possible cultural confounders, the sample size alone provides excellent population data. In addition, the sex distribution was

representative. The study's weakness was the omission of waist to hip measures as a possible intervening variable.

Clinicians can add the findings of this study to their health assessment protocols. Evidently, some obesity is healthier for older men and women than was previously acknowledged. The findings support lower BMIs for younger people, yet caution against too low a BMI. In this study, a BMI <20 kg/m² was considered a substantial health risk.

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1 Health and Welfare Canada. *Promoting healthy weights: a discussion paper*. Ottawa: Minister of National Health and Welfare, 1988.

2 VanItallie TB, Simopoulos AP. *Nutrition Today* 1993;Jul-Aug:33-5.

3 Brownell KD, Rodin J. *Arch Intern Med* 1994; 154:1325-30.