Obesity and Mortality in a Pooled Analysis of Three Prospective Cohorts of Korean Adults: Is Obesity Paradox the BMI Paradox?

Hajin Jang,[1] Rockli Kim,[1] Dong Hoon Lee,[2] Jong-Tae Lee,[1] Edward Giovannucci,[2] and Hannah Oh,[1]

[1]Korea University and [2]Harvard T.H. Chan School of Public Health

Objectives: It is unclear whether the obesity paradox (observation of lower mortality in overweight vs. normal-weight adults) consistently exists in Asian population after accounting for body composition (fat vs. fat-free mass). We examined the associations of body mass index (BMI) with mortality in Korean adults while carefully controlling for various sources of biases, including those from body composition.

Methods: We conducted a pooled analysis of three prospective cohort studies from the Korean Genome and Epidemiology Study Project (n = 153,248; mean age = 53.8 years; mean follow-up = 9.6 years; number of total death = 6,061). Weight and height were directly measured at baseline. Fat-free mass index (fat-free mass/height squared) was derived using a validated prediction model. Using Cox proportional hazards models, we estimated multivariable-adjusted hazard ratios (HRs) and 95% confidence intervals (CIs) for the associations of BMI with all-cause, cardiovascular, and cancer mortality. The nonlinear shape of the association was assessed using restricted cubic spline models. We compared the models after excluding older adults (age >70 years), ever smokers, and deaths occurred during the first 5 years of follow-up. We also compared the models after further adjustment for fat-free mass index.

Results: Among participants without a history of cancer or cardiovascular disease, the relation between BMI and all-cause mortality was J-shaped. Compared with normal-weight adults (BMI 18.5–22.9), the lowest risk of all-cause and cardiovascular mortality was observed among overweight adults (BMI 23.0–24.9: HR [95% CI] = 0.89 [0.83–0.96]; 0.94 [0.79–1.13]; respectively), while for cancer mortality among grade I obesity (BMI 25.0–29.9: 0.91 [0.83–1.01]). After excluding older adults, ever smokers, and deaths occurred during the first 5 years of follow-up, the overall patterns of the associations did not change. After adjustment for fat-free mass index, the J-shaped relation changed into a monotonically positive association, showing the lowest mortality among underweight and normal-weight adults.

Conclusions: Our findings suggest that the obesity paradox in Asian population may be at least partially explained by confounding due to fat-free mass.