Associations of childhood-to-adulthood body size trajectories and genetic susceptibility with the risks of osteoarthritis: a population-based cohort study of UK Biobank data

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Abstract

Background Large adulthood body size was associated with increased risk of osteoarthritis. We aimed to examine the association between body size trajectories from childhood to adulthood and potential interactions with genetic susceptibility on osteoarthritis risk.

Methods We included participants from the UK Biobank aged 38–73 years in 2006–10. Childhood body size information was collected by questionnaire. Adulthood BMI was assessed and transformed into three categories (<25 kg/m² for normal, 25–29·9 kg/m² for overweight, and >30 kg/m² for obesity). A Cox proportional hazards regression model was applied to assess the association between body size trajectories and osteoarthritis incidence. Osteoarthritis-related polygenic risk score (PRS) was constructed to evaluate its interactions with body size trajectories on osteoarthritis risk.

Findings For the 466 292 participants included, we identified nine body size trajectories [thinner to normal (11·6%), overweight (17·2%), or obesity (26·9%); average to normal (11·8%), overweight (16·2%), or obesity (23·7%); and plumper to normal (12·3%), overweight (16·2%), or obesity (23·6%)]. Compared with individuals in the average-to-normal group, all other trajectory groups had higher risks of osteoarthritis, after adjustment for demographic, social-economic and lifestyle covariates (hazard ratios [HRs] 1·05–2·41; all p<0·01). Among them, thinner-to-obesity (HR 2·41; 95% CI 2·23–2·49) had the most prominent association with increased osteoarthritis risk. A high PRS was significantly associated with an increased risk of osteoarthritis (1·14; 1·11–1·16), whereas no interaction between childhood-to-adulthood body size trajectories and PRS on osteoarthritis risks was observed. The population attributable fraction suggested that body size towards normal in adulthood could eliminate osteoarthritis cases by 18·67% for thinner-to-overweight to 38·74% for plumper-to-obesity.

Interpretation Average-to-normal body size seems to be the healthiest childhood-to-adulthood trajectory for osteoarthritis risk, whereas a trajectory of increased body size from thinner to obesity has the highest risk for osteoarthritis. These associations are independent of osteoarthritis genetic susceptibility.

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Contributors

ZZ, MZ, QY, SC and YZ designed the study. MZ, SC, TF, HY, PC, YZ, and YQ managed and analyzed the data. MZ wrote the first draft of the article. All authors contributed to data interpretation and preparation of the report. All authors provided intellectual content to the manuscript and approved the submission.

Declaration of interests

We declare no competing interests.