

THE ASSOCIATION BETWEEN CHILDHOOD OBESITY MEASURES AND ADULTHOOD KNEE CARTILAGE DEFECTS: A 25-YEAR COHORT STUDY

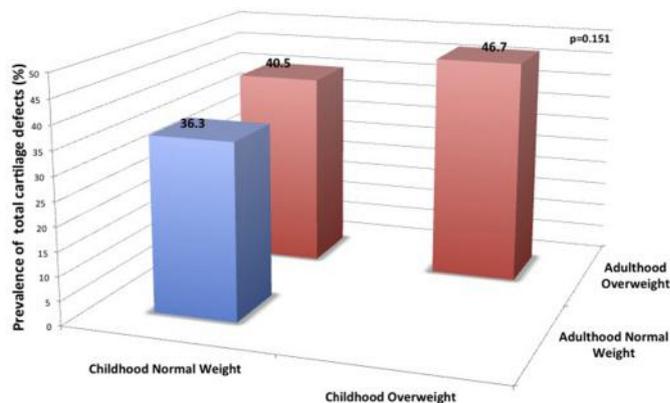
B. Eathakkattu Antony¹, S. Thayer², A. Venn¹, A. Halliday², F. Cicuttini³, L. March⁴, T. Dwyer⁵, G. Jones¹, C. Ding^{1,3}.

¹Menzies Inst. for Med. Res., Univ. of Tasmania, Hobart, Australia; ²Dept. of Radiology, Royal Hobart Hosp., Hobart, Australia; ³Dept. of Epidemiology, Monash Univ., Melbourne, Australia; ⁴Inst. of Bone and Joint Res., Univ. of Sydney, Sydney, Australia; ⁵Murdoch Childrens Res. Inst., Univ. of Melbourne, Melbourne, Australia

Purpose: Obesity and overweight measures have been associated with knee cartilage defects. However, no study has investigated the long-term association between childhood overweight measures and knee cartilage defects assessed using magnetic resonance imaging (MRI) in young adults. The aim of this study was to describe the associations between weight, body mass index (BMI), overweight status and body composition measures in childhood and the prevalence of cartilage defects 25 years later in a young population-based sample.

Methods: Participants broadly representative of the Australian population (n = 314, aged 31-41 years, female 48%) were selected from the Childhood Determinants of Adult Health Study (a long-term follow-up study of the Australian Schools Health and Fitness Survey of 1985). Height, weight, and knee injury status were recorded, and 1.5T MRI scan of the knee was performed in adulthood. Cartilage defects were assessed on T1-weighted fat saturated and proton-density fat saturated images using a modified Outerbridge scoring system (grade 0-4) in tibial, femoral and patellar regions. Any cartilage defect was defined as a score of 2. Childhood height and weight were measured according to standard protocols 25 years prior (at the age 7-15 years), and BMI and overweight were calculated according to the age and sex specific cut-off points (Cole TJ). Change in overweight status from childhood to adulthood was categorised according to the transitions of overweight status (normal weight at both time, overweight at both time, normal weight at childhood and overweight at adulthood) from childhood to adulthood. Fat mass and lean mass were derived from the skinfold measurements in childhood and adulthood.

Results: The prevalence of any cartilage defect in this population-based young adult cohort was 38.5% (tibiofemoral: 15.0%, patellar: 24.5%). Females had a higher prevalence of cartilage defects compared to men (43% vs 34% in whole knee, and 30% vs 20% at patellar site). There were no significant associations between childhood obesity or body composition measures and adulthood total cartilage defects or tibiofemoral cartilage defects. However, participants who were overweight in both childhood and adult life had an increased prevalence of total cartilage defects (46.7% of participants, RR: 1.37, 95% CI: 0.82, 2.28) compared with those who had normal weight in both childhood and adult life (36.3% of participants).



Childhood weight, BMI, fat mass and overweight measures were significantly associated with the higher risk of patellar cartilage defects in adulthood after adjustment for childhood age, duration of follow-up, sex, height (if weight or fat mass/lean mass was the predictor), childhood and adulthood injury. These associations persisted after further adjustment for adulthood corresponding measures (RR: 1.05, 95% CI: 1.01,1.08 for weight; RR: 1.09, 95% CI: 1.00,1.18 for BMI; RR: 1.11, 95% CI: 1.01,1.21 for fat mass; RR: 1.82, 95% CI: 1.01,3.28 for overweight status). There was no association between childhood lean mass and adulthood patellar cartilage defects. Participants who were overweight in both childhood and adult life had an increased prevalence of patellar cartilage defects (40% of participants, RR: 1.77, 95% CI: 0.88,3.55) compared with those who had normal weight in both childhood and adult life (24.2% of participants).

Conclusions: Childhood overweight measures were significantly associated with increased risk of patellar cartilage defects in young adults, independent of the adulthood overweight measures. These indicate the importance of reducing childhood obesity in preventing adulthood knee structural abnormalities that cause osteoarthritis in later life.