

Birth weight and weight gain during early life in relation to body composition and cardiovascular disease risk of rural Thai adolescents

Introduction: Under- and overnutrition during early childhood may lead to alterations in metabolic programming, thereby predisposing individuals to early obesity and increase risks of chronic non-communicable diseases (NCD). This study aimed to determine the influence of birth weight and weight gain during early childhood on body mass index-for-age Z-scores (BAZ), waist circumference (WC), body fat, and cardiovascular disease (CVD) risk at 14 years old.

Methods: A longitudinal study was conducted in Khon Kaen province in the northeast of Thailand. Weight, height, and WC of 461 adolescents (Male 247 vs. Female 214) were measured at 14.1 ± 0.3 years of age and BAZ was calculated using WHO AnthroPlus. Blood lipids and blood glucose were assessed using standard techniques. Body composition was assessed using deuterium dilution technique (D2O). A composite CVD risk score was created using the 4 selected CVD risk factors, including triglyceride, HDL-cholesterol, LDL-cholesterol, and blood glucose. Standardized residuals of the selected factors were created by regressing them on age, sex, and sexual maturation. The standardized HDL-cholesterol residuals were multiplied by -1 and then all standardized residuals of the 4 factors were summed to create the CVD risk score. The higher CVD risk score represented the less favorable CVD profile. Exposures were birth weight and weight gain during each of the following periods: birth-4 months, 4 months-1 year, 1-9 years, and 9-14 years. Multiple-stage least square analyses were used to generate uncorrelated residuals of weight gain and tested the independent relationships of birth weight and weight gain with BAZ, WC, body fat, and CVD risk score at adolescents.

Results: Birth weight and weight gain at all periods were positively related with BAZ and WC; the strongest being the weight gain between ages 1-9 and 9-14 years with higher BAZ and WC at 14 years old in both male and female adolescents. Birth weight and weight gain of all periods were positively related with body fat in males. On the other hand, only weight gain between birth-4 months, 1-9 years, and 9-14 years were related with body fat in females. Only a weak, but significant relationship between weight gain during 9-14 years and CVD risk score was found among females.

Conclusion: In this study setting, higher birth weight and weight gain during early childhood were consistently related with higher BAZ, WC, and body fat, but not the CVD risk at adolescence, which may need a longer follow-up. Promotion of appropriate weight gain during early childhood till preadolescent years are important and possibly reducing the risk of NCD in later adulthood.

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