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The impact of antibiotic exposure during infancy on weight and height

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Background

Antibiotics have direct effects on human gut, and intestinal microbiota in infants is particularly vulnerable for perturbation. Subtherapeutic doses of antibiotics have been used in growth promotion by cattle farmers since 1950's. In cattle, the effect of antibiotics on growth is the more pronounced the younger the age is at exposure (1). In addition, antibacterial agents are reported to promote growth in severely malnourished children in developing countries with unknown mechanisms (2), but little is known about the effects of antibiotics on growth under more optimal living conditions in Western countries (3,4).

Objectives

The objective of the study was to evaluate the impact of antibiotic exposure during infancy on weight and height in a healthy Finnish child population.

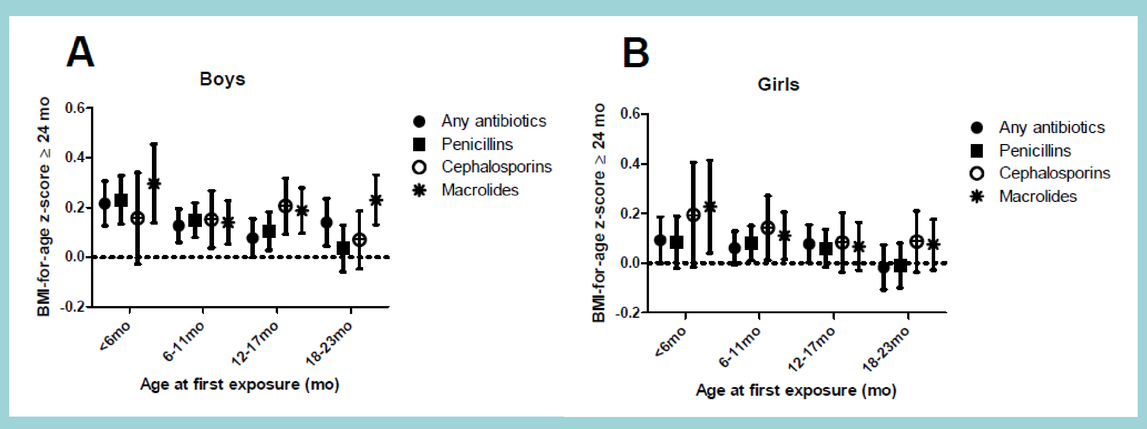

Figure 1. Differences of means (95% CI) for body mass index-for-age z-score at the age of 24 months ~~or over~~ according to six months periods at the age of the first antibiotic exposure compared to not-exposed boys (A) and girls (B).

Subjects and Methods

Longitudinal weight and height data were obtained for healthy 6,114 boys and 5,948 girls at the median age of 24 months (range 24-74 mo). Data on outpatient prescriptions of antibiotics from birth until 23 months of age were collected from the Drug Purchase Register. Perinatal data potentially affecting growth were obtained from the database of National Institute of Health and Welfare including maternal and newborn information. Body mass index and height as z-scores (zBMI, zH) were compared between exposed and non-exposed children using covariance analysis with perinatal factors as covariates.

Results

Exposed children were on average heavier than non-exposed children at the age of 24 months [(adjusted zBMI difference 0.13 SD (95% CI 0.07 – 0.19, P < 0.001) for boys and 0.05 SD (0.01 – 0.12, P < 0.05) for girls]. The effect on height was not as pronounced as weight in exposed children.

The most pronounced increase in adjusted zBMI was seen in children with the first exposure before 6 months of age [for boys 0.22 SD (0.13 – 0.31), and for girls 0.09 SD (0.00 – 0.19)] (**Figure 1**). This effect was mainly associated to exposure to macrolides both in boys 0.30 (0.14 – 0.46) and girls 0.23 (0.04 – 0.42). voisiko fig 1 tulla tähän väliin?

Adjusted zBMI increased with the increasing number of separate antibiotic courses (**Figure 2**), and there was a linear trend against the number of antibiotic exposures (P < 0.001).

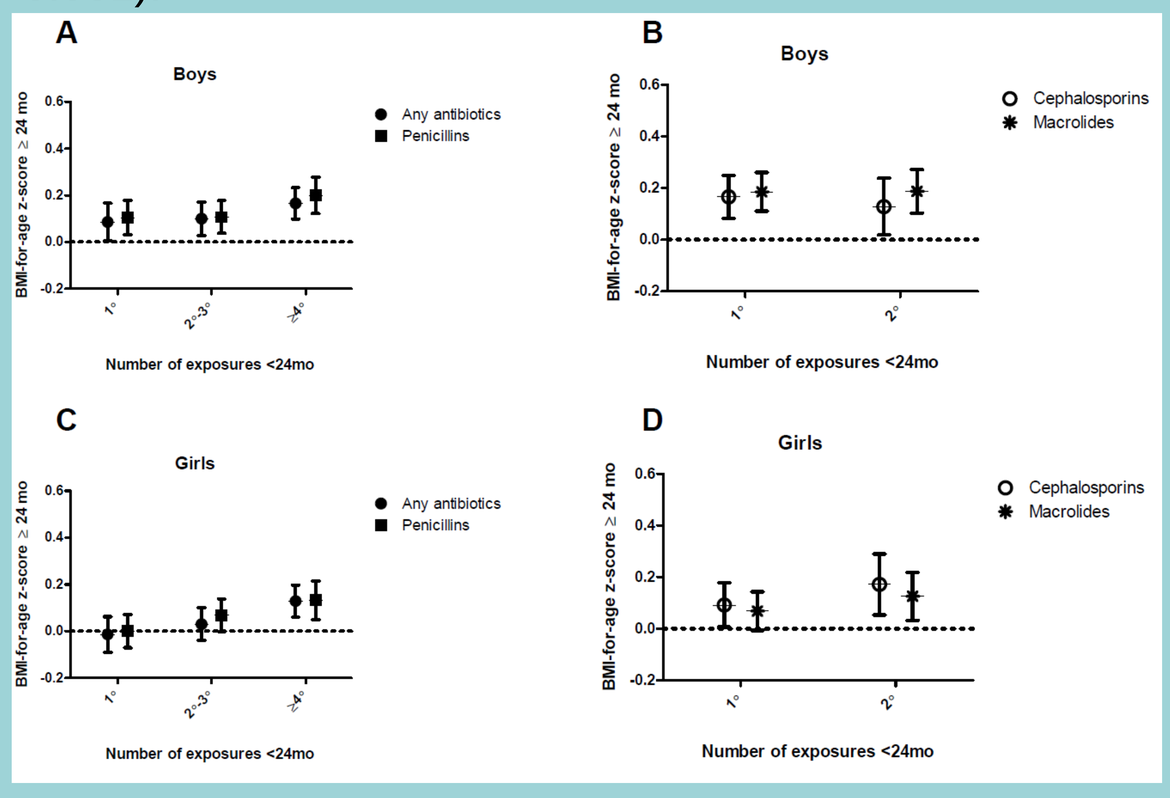

Figure 2. Differences of the means (95% CI) of body mass index-for-age z-score at the age of 24 months ~~or over~~ by number of antibiotic courses from birth to 23 month of age. Zero line indicates non-exposed boys (A & B) and girls (C & D).

Conclusions

Antibiotic exposure at the age below 6 months, or repeatedly during infancy has an increasing effect on body mass seen at 24 months of age in healthy children. Exposure to macrolides seems to have the most pronounced effect on body composition. These unexpected effects of antibiotics highlight the importance of critical use of antibiotics in early infancy. Considering the prevalence of antibiotic use, this effect may potentially influence the ongoing childhood obesity epidemic.

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