

Growth in the womb and early infancy predicts bone size and strength in childhood

26 March 2012

Researchers from the MRC Lifecourse Epidemiology Unit, University of Southampton, have presented evidence that early growth predicts the size, mineralisation, shape and strength of the hip bone in childhood. The presentation was made at the European Congress on Osteoporosis & Osteoarthritis (IOF-ECCEO12) which took place in Bordeaux, France from March 21-24, 2012.

The study, led by Dr Nicholas Harvey, Senior Lecturer at the MRC LEU, recruited 493 mothers and their offspring from the Southampton Women's Survey, a unique study of mothers and their children. Using high resolution ultrasound, growth of the baby in the womb was measured from 11 weeks to 34 weeks gestation. After birth the infant's length/height was measured at birth, 6, 12, 24, 36 and 48 months enabling speed of growth over these times to be calculated. Hip size, density and shape at 6 years were assessed using bone density scanning (DEXA) and special hip structure analysis software.

The researchers found that growth in length across all fetal and infant time intervals was positively related to total [hip bone](#) size and bone mineral content, and to femoral neck cross-sectional area and bending strength. Associations were similar when boys and girls were analysed separately. Femoral neck cross sectional area and bending strength were particularly strongly related to growth velocity in late pregnancy and in the first 2 years after birth.

The study, which forms part of a wider programme of work led by Professor Cyrus Cooper, Director MRC LEU, investigating the role of the early environment on later risk of fracture, demonstrates that early growth predicts hip size, mineralisation, shape and strength at six years old. The relationships are particularly strong in late

pregnancy and in the first two years of postnatal life suggesting that these might be critical periods in which there is potential for long term influence on the later skeletal growth trajectory. Since stronger hips will protect against future hip fracture in older age, these results may help to understand ways in which early growth can be optimised to reduce the risk of osteoporotic fracture in older age.

Dr Nicholas Harvey, Senior Lecturer, MRC LEU, says, "Osteoporotic fractures are extremely common and have an enormous impact both at the individual, societal and economic level. This study suggests that how well you grow in the womb and the first few years of life might influence the strength of your hip and therefore how likely you are to be at risk of an osteoporotic [hip](#) fracture in older age."

Professor Cyrus Cooper, Professor of Rheumatology and Director of the MRC LEU, adds: "[Osteoporosis](#) in older people is a major public health problem because of associated fractures. This and other investigations underway at the MRC LEU will, we hope, pave the way for potential future strategies aimed at improving childhood bone strength and thus making them less at risk of osteoporosis and broken bones in later life."

More information: Childhood hip strength is predicted by growth in utero: The Southampton Women's Survey. Harvey NC, Cole ZA, Crozier SR, et al. *Osteoporos Int* Vol 23 (2012), Supplement 2 (Abstract 0C17)

Provided by International Osteoporosis Foundation

APA citation: Growth in the womb and early infancy predicts bone size and strength in childhood (2012, March 26) retrieved 3 May 2021 from <https://medicalxpress.com/news/2012-03-growth-womb-early-infancy-bone.html>

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