Farming at Young Age May Lead to Bone Disease in Adulthood

CINCINNATI—Although farm chores are likely to keep young boys in shape and out of trouble, University of Cincinnati (UC) environmental health experts caution that it could be harmful to overall bone health if done too often at a young age.

A UC research team recently reported data suggesting that excessive weight-bearing activities—such as squatting, kneeling or lifting—can affect the mechanical properties of developing bone. They say this could leave junior farmers more susceptible to degenerative skeletal disorders later in life.

“Research has clearly shown that healthy adults who engage in excessive weight-bearing activities often develop bone disorders,” explains Amit Bhattacharya, PhD, a UC professor of environmental health and principal investigator of the study. “These excessive, repetitive weight-bearing activities could cause irreparable trauma and impair growth in young children whose bones are still developing.”

The UC-led team’s findings were published in June 2008 issue of Journal of Agromedicine.

For this pilot study, Bhattacharya’s team wanted to know if high levels of load-bearing activity done repetitively, such as shoveling chicken feed, would cause changes in the mechanical properties of bone—specifically, mass and structural strength.

The team recruited 36 boys, age 12 to 19, from Butler County, Ohio, to study the biomechanical properties of developing bone. Eighteen boys had a history of regular work on family farms and the remainder were not involved in farm-related activities.

Researchers developed a list of 22 tasks children of this age might be asked to do. Each boy was surveyed about the tasks he performed to split participants into farm and non-farm groups.

In order to gauge overall bone health, the team took two measurements: bone mass, which is a measure of how much bone exists, and dynamic bone quality, the bone’s ability to sustain incoming force during physical activity. A person’s bone mass continues to accumulate up through their mid 20s.

“If bone is unable to adequately absorb incoming shockwaves, it can cause microdamage and eventually crack,” explains Bhattacharya. “When it happens at a lower level, the body can recover. But if happens too much and more frequently in developing bone, it may predispose these children to degenerative skeletal disorders later in life.”

The UC study showed that young boys who participated in regular farming activities had significantly lower bone-damping ability compared to the non-farming group. “Damping” refers to the bone’s ability to absorb shock when the heel strikes the ground.

“We've detected signs that high levels of cumulative weight-bearing activity during a time of rapid bone growth could cause chronic trauma to bone growth plates,” says Bhattacharya. “Larger studies are needed to determine the extent of damage, but our initial findings support taking a closer look at how much physical activity farming children are doing and make sure their bone is developing normally for their age.”

Bhattacharya points out that weight-bearing activities are not bad—it’s excessive activity in this age group that causes concern.

Increased stress concentrations cause maladaptations in bone modeling, which can lead to osteoarthritis conditions that make the bones very stiff and cause damage to the cartilage between the bones.

“It’s a very sensitive balance of what is acceptable and at what point it becomes dangerous,” he adds.

UC’s Nelson Watts, MD, Jessica Gordon, and Rakesh Shukla, PhD; Thomas Waters, PhD, of the National Institute for Occupational Safety and Health; Steve Bartels, of the Ohio State University Butler County extension office; and Robert Colman of SignaLysis, Inc. also participated in this National Institute for Occupational Safety and Health-funded research.

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