# Anorexic girls have increased bone density after physiological estrogen treatment

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Estrogen therapy improves low bone density due to anorexia nervosa in teenage girls with the disease when given as a patch or as a low oral dose that is physiological (close to the form or amount of estrogen the body makes naturally). These results of a new study are being presented Monday at The Endocrine Society's 93rd Annual Meeting in Boston.

A large proportion of adolescents with this eating disorder have low bone density and therefore are at an increased risk of fractures, said Madhusmita Misra, MD, the study's lead author and an associate professor of pediatrics at Harvard Medical School and Massachusetts General Hospital in Boston. An important cause of this low bone density is low levels of estrogen, a hormone in the body that prevents bone loss.

"Previous studies have shown that giving oral estrogen combined with progesterone as birth control pills is not effective in increasing bone density in girls with anorexia nervosa," Misra said. "However, the impact of giving estrogen in a more natural, or physiological, form has not been previously studied in girls with anorexia nervosa."

This National Institutes of Health-funded study explored, over an 18-month period, the effect of physiological estrogen replacement on bone accrual rates in 110 female patients with anorexia nervosa. These patients and 40 healthy-weight girls as controls were between ages 12 to 18 years, a common time for anorexia nervosa to start and also an important time for building optimal bone mass, Misra said.

Girls with anorexia nervosa were randomly assigned to receive either a placebo (an inactive substance) or one of two types of estrogen based on their bone maturity. The researchers estimated bone maturity (whether growth plates had closed) based on wrist and hand X-rays. Those girls with mature bone received either placebo or a full adult dose of estrogen (100 micrograms of estradiol) given via a skin patch. This transdermal form is a natural form of estrogen, Misra said. Girls receiving estrogen also received cyclic progesterone pills to reduce the risk of endometrial cancer.

Girls with anorexia nervosa whose bones were immature received incremental low doses of oral estrogen, ranging from 3.75 to 11.25 micrograms of estradiol. These low, natural levels mimic estrogen levels seen in early puberty and avoid accelerating fusion of the growth plates, which would otherwise limit height potential, Misra said. Healthy-weight controls received no treatment other than calcium and vitamin D supplements, which all subjects received.

Using dual-energy X-ray absorptiometry (DEXA) bone density scans, the researchers assessed bone mineral density at the lumbar spine (lower back), hip and whole body. Physiological estrogen administration caused a significant increase in bone density at the spine and hip, compared with placebo, as found on DEXA Z-scores, the authors reported. However, Misra said that estrogen did not result in a complete "catch-up" to normal bone density measures. Girls with anorexia nervosa still had lower bone density than healthy-weight controls did.

"In addition to weight gain, physiological estrogen could be a potential therapeutic option for optimizing bone mass in girls with anorexia nervosa," Misra said. "The decision to treat would depend on the individual patient and her fracture risks."

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