The Effect of Inducing Hypothyroidism in Gestating Pigs on Fetal Bone Development and Skeletal Mineralization of the Offspring

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Although hypothyroidism has been extensively studied for its effect on human health, its impact on skeletal development remains insufficiently explored. Thyroid hormones are regulators of bone growth, mineralization, and maturation, so this study analyzes skeletal outcomes after induced hypothyroidism in order to quantify how maternal exposure to the antithyroid drug methimazole (MMI) affects bone maturation and mineralization in offspring. Data collection required a combination of Dual Energy X-Ray Absorptionmetry (DXA) analysis and bone dissections. DXA scanning generated quantitative values for Bone Mineral Content (BMC), Bone Mineral Density (BMD), and Bone Area. Bone dissections were performed to obtain morphometric measurements, including anterior-posterior widths, medio-lateral widths, and total bone length. This combined use of DXA data and conducting dissections provides a holistic overview of the effect of inducing hypothyroidism-drug MMI on bone morphological structure and mineralization during bone development. A 2 way ANOVA test was conducted with the independent variables being treatment (MMI vs Control), gestation day, and their interaction. Across all groups, total bone length, medio-lateral widths, and anterior-posterior widths, and DXA data values demonstrated a significant increase as gestation day progressed, indicating continued bone growth and mineralization over time. Additionally, the interaction between the treatment and gestation day was significant for some tissue samples, yet this was mainly seen in the left side rather than the right, indicating side-specific differences in skeletal response under hypothyroidism treatment.

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