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Hormonal Contraceptive Use and Bone Accrual Rates in Adolescent Females

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Exogenous hormone exposure in adolescence may affect lifetime fracture risk, as ~30% of bone mass is accrued from menarche to peak bone mass. **PURPOSE:** We investigated associations of hormonal contraceptive (HC) use with bone accrual rates from circum-menarche (MEN) to peak bone mass (PBM) in gymnasts (GYM) and non-gymnasts (NON). **METHODS:** A 20-year prospective longitudinal study of bone accrual in GYM vs. NON yielded annual DXA data for bone mineral content (BMC) and areal bone mineral density (BMD) at key sites: 1/3 radius (1/3), ultra-distal radius (UD), lumbar spine (LS) and femoral neck (FN). A subset of data was analyzed to evaluate annualized BMC and BMD gains from MEN (-1.0 to +1.0 yrs post-menarche) to PBM (+4.0 to +6.67 yrs post-menarche). Inclusion criteria were ≥1 qualifying scan per site during each maturity stage (MEN & PBM) and self-reported data on HC use for the inter-scan interval. HC use from MEN to PBM was categorized as no HC use, ≤2 yrs HC use or >2 yrs HCuse. Multiple regression analysis evaluated GYM status and HC use as factors in site-specific BMC and BMD gains; covariates were entered based on correlation matrix results. Standardized β (stβ) and significance are presented (SPSS v24: α= 0.05). **RESULTS:** From a total sample of 211, eligible sample size was n=78. Weak negative trends were observed between HC use and annualized gains in FNBMD (stβ= -0.156, p = 0.157), LSBMD (stβ= -0.172, p = 0.102) and LSBMC (stβ= -0.160, p = 0.153), but no clear associations were seen between HC use and UDBMC, UDBMD, 1/3BMC, 1/3BMD or FNBMC (stβ= -0.083 to +0.114, p= 0.330 to 0.865). Gymnastic exposure at MEN (GYM n= 39; NON n= 39) was associated with weak trends for lower annualized gains in FNBMD (stβ = -0.156, p = 0.157), LSBMD (stβ = -0.172, p = 0.102) and LSBMC (stβ = -0.160, p = 0.153). **CONCLUSION:** Non-significant trends, with small effect sizes, suggest higher FNBMD and LSBMD accrual rates from MEN to PBM for non-users vs. HC users and for non-gymnasts vs. circum-menarcheal gymnasts. Lower accrual rates in GYM vs. NON, from MEN to PBM, may be due to potential inter-scan decreases in GYM loading, increases in NON loading, and/or to the possibility that, by MEN, GYM had already maximized bone loading gains via pre-menarcheal loading. Future studies should evaluate interactions between exercise loading doses and HC use using a larger sample size.

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