A LONGITUDINAL INVESTIGATION INTO THE EFFECTS OF MENSTRUAL CYCLE RESTORATION IN FEMALES WITH ANOREXIA NERVOSA: POSSIBLE ANALOGIES WITH THE FEMALE ATHLETIC TRIAD.
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Hypothalamic pituitary gonadal dysfunction is commonly associated with the female athletic triad and anorexia nervosa. The aim of this study was to quantify differences in and investigate the effect of menstrual cycle restoration on bone mineral density (BMD), bone turnover markers, eating attitude and profile of mood states (POMS) in non-athletic females with a diagnosed eating disorder by comparison with age-matched controls.

Eumenorrhoeic control (Con; n=10) and anorexic (ANX; n=20) volunteers were enrolled in a 2 year study. Areal BMD (g.cm$^{-2}$) for the lumbar vertebrae (L1- L4) and left hip (femoral neck and total hip) were assessed by dual energy X-ray. Duplicate scans were performed at start-up to assess reliability and precision of BMD data. Eating attitude and profile of mood state were assessed using the EAT26 and POMS questionnaires. Fasting blood samples were collected for haematology, serum 946;-cross laps, osteocalcin and alkaline phosphatase assessment. Volunteers were provided with supplemental calcium to ensure adequate intake, menstrual cycles in ANX was restored by oestrogen replacement therapy. Variables were assessed annually over 2 year follow-up period. Data analysed using a 2-way ANOVA with time as a repeated measure, post-hoc Bonferroni tests quantified differences, P<0.05 inferred statistical significance.

No significant differences were observed in BMD at any site for Con across time. In contrast, for ANX compared to baseline clinically significant increases (>95%LOA) in L1-L4 BMD were observed at 12 and 24 month. Significant increases were also observed in femoral neck and total hip data, increases were significant (P<0.001) from 12 month and by 24 month were >95%LOA, inferring clinically significance. At all times BMD for L1-L4 and both hip sites were significantly greater (P<0.001) for Con compared to ANX. Mean % annual increase in ANX for L1-L4, femoral neck and total hip BMD were 3.0, 2.6 and 3.2%, respectively, changes in BMD were not strongly associated with changes in mass over time. Across time no significant changes were observed in mean EAT26 score for Con, EAT 26 data for ANX were significantly (P<0.001) reduced from 12 month and were 50% of baseline by 24 month. Trends were observed for mood states for ANX by 12 months; anxiety, depression, fatigue and confusion were showing reductions, vigour was displaying an increase; by 24 month anxiety was significantly decreased (P<0.01) and vigour was significantly (P<0.01) increased. No significant time or group effects were recorded for alkaline phosphatase or osteocalcin. Significant time and group effects with no time by group interaction were recorded for beta-cross laps, significantly (P<0.05) lower data for ANX were recorded at 12 and 24 month compared to Con.

Restoration of menstrual function resulted in positive effects on BMD, eating attitude and mood state; these effects were not mirrored by all bone turnover markers.

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