



# Trabecular structure analysis of the distal radius in adolescent patients with anorexia nervosa using ultra high resolution flat panel based volume CT

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Anorexia nervosa (AN) is a known risk factor for the development of osteoporosis and is associated with low bone mineral density (BMD). The onset of AN during adolescence is of particular concern because this is a crucial time for bone mass accrual toward achievement of peak bone mass.

The purpose of our study was to examine trabecular microarchitecture using ultra high-resolution flat panel Volume CT (fpVCT) and BMD using DXA in adolescent girls with AN and to compare these results with age-matched normal weight controls. We hypothesized that parameters of bone microarchitecture would be adversely affected in AN regardless of BMD findings as assessed by DXA.

We studied a total of 20 girls aged 12-18 years (10 girls with AN, 10 healthy controls). AN subjects had mild illness in that although all met the criteria for diagnosis, they were 80% ideal body weight for age.

To determine differences in bone microarchitecture between girls with AN and healthy controls, CT of the ultra-distal radius was performed using fpVCT (voxel size 0.2 x 0.2 x 0.2 mm<sup>3</sup>). The following apparent (app.) measures of trabecular structure were calculated: app. trabecular bone volume fraction (BV/TV), app. trabecular number (TbN), app.

trabecular thickness (TbTh), and app. trabecular separation (TbSp), using standard methods from histomorphometry. We used DXA to measure BMD using a Hologic QDR 4500 scanner (Hologic Inc., Waltham, MA).

Girls with AN did not differ from healthy controls in chronological age, bone age, or Tanner stage. Girls with AN had lower BMI, fat mass and % body fat compared to normal weight controls, as expected, while there was no significant difference in lean mass between the two groups. Trabecular structure measurements were significantly different between AN and normal weight groups. Subjects with AN showed significant lower values in app. BV/TV, app.TbTh, and higher values in app.TbSp compared to normal weight controls. App.TbN was lower in AN but the difference was not significant. There was no significant difference in BMD measurements of the spine and hip between subjects with AN and controls. Our results show that trabecular structure parameters of the distal radius, measured using fpVCT, provide markers that can differentiate between adolescents with AN and normal weight controls despite normal BMD. Even in early or mild forms of AN, trabecular structure is already abnormal, while BMD remains within normal limits.

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The authors have no conflict of interest.

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