Göteborg, 2023

Bone health and nutrition treatment

Studies on young women with anorexia nervosa
and children with epilepsy

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademin, Göteborgs universitet kommer att offentligen försvaras i hörsal Tallen, Drottning Silvias barnsjukhus, Göteborg, den 29 september 2023, kl 09:00

av **Anna Svedlund**

Fakultetsopponent: **Kristina Åkesson**, Professor, Lunds universitet, Sverige

Avhandlingen baseras på följande delarbeten:

I. **Svedlund A**, Pettersson C, Tubic B, Magnusson P, Swolin-Eide D. Vitamin D status in young Swedish women with anorexia nervosa during intensive weight gain therapy. European Journal of Nutrition 2017; 56: 2061–2067.

II. **Svedlund A**, Tubic B, Elfvin A, Magnusson P, Swolin-Eide D. The significance of the *FTO* gene for weight and body composition in Swedish women with severe anorexia nervosa during intensive nutrition therapy. Journal of the American College of Nutrition 2022; 41: 594–599. DOI: 0.1080/07315724.2021.1945979 (New journal name from 2022: Journal of the American Nutrition Association).

III. **Svedlund A**, Pettersson C, Tubic B, Ellegård L, Elfvin A, Magnusson P, Swolin-Eide D. Bone mass and biomarkers in young women with anorexia nervosa: a prospective 3-year follow-up study. Journal of Bone and Mineral Metabolism 2022; 40: 974–989.

IV. **Svedlund A**, Hallböök T, Magnusson P, Dahlgren J, Swolin-Eide D. Prospective study of growth and bone mass in Swedish children treated with the modified Atkins diet. European Journal of Paediatric Neurology 2019; 23: 629–638.

SAHLGRENSKA AKADEMIN

INSTITUTIONEN FÖR KLINISKA VETENSKAPER

GÖTEBORGS UNIVERSITET

Göteborg, 2023

Bone health and nutrition treatment

Studies on young women with anorexia nervosa and children with epilepsy

Anna Svedlund
Department of Pediatrics, Institute of Clinical Sciences, Sahlgrenska Academy, University of Gothenburg, Sweden

Abstract

Background: Adequate nutritional status is crucial for optimal longitudinal growth and accrual of bone mass during childhood and adolescence. Peak bone mass achieved in young adulthood affects bone health throughout life. Anorexia nervosa (AN) is associated with impaired bone health, and the cornerstone for treatment is weight restoration through nutrition treatment. For children with refractory epilepsy, the modified Atkins diet (MAD) is a treatment option to reduce the number of seizures. **The aim** of this thesis was to clarify the effects of these two different nutrition treatments on bone health, body composition, and growth. **Methods and results**: Two cohorts were studied: young women with AN (papers I–III) and children with therapy-resistant epilepsy (paper IV). In paper I, levels of 25-hydroxy vitamin D (25(OH)D) were evaluated in 25 young women with severe AN during 12 weeks of intensive nutrition treatment; the level was found to be adequate but decreased during treatment despite a high intake. No association was found between 25(OH)D and BMI or bone mass measured with dual-energy X-ray absorptiometry (DXA). In paper II, the role of the fat mass and obesity associated (*FTO*) gene for weight gain and body composition was evaluated, and no difference between the genotype groups (AA, TA, and TT) was observed. Paper III is a 3-year follow-up of women with AN, where bone health was assessed by DXA, peripheral quantitative computed tomography, and bone biomarkers and compared to healthy young women. BMI and body composition were stable, and there were positive changes in bone biomarkers. Despite this, trabecular density decreased, and most bone mass parameters were lower in AN subjects than in the healthy women. In paper IV, growth, and bone mass measured with DXA and with DXA and laser was evaluated in 38 children with epilepsy treated with MAD for 24 months. Of these, 53% responded well to the diet (seizure reduction >50%) and there were no negative effects on growth or bone mass.

Conclusions: A high intake of vitamin D is needed to preserve sufficient vitamin D levels during in-hospital nutrition treatment for AN. Individualized nutrition treatment for AN based on the *FTO* genotype could not be supported according to our study. AN in adolescence negatively affects bone acquisition, which is why early evaluation of bone health and a structured long-term follow-up is essential in women with AN, even in individuals who have recovered. MAD is effective for seizure reduction and can be considered a safe epilepsy treatment option in children and adolescents in terms of growth and bone health.

Keywords: intensive nutrition treatment, modified Atkins diet, vitamin D, *FTO*, bone mass, bone biomarkers, growth, skeleton, anorexia nervosa, eating disorder

ISBN 978-91-8069-129-1 (PRINT)
ISBN 978-91-8069-130-7 (PDF)

http://hdl.handle.net/2077/75907