P2 – 427: rhGH Replacement Therapy Ameliorates Body Composition Substantially But Has No Effect in the Quality of Life in Adolescents with GH Deficiency – A Cross-Sectional Study

HELLENIC REPUBLIC
National and Kapodistrian University of Athens

Charikleia Stefanaki[1,2], MD, MSc, George Paltoglou[1,2], MD, PhD, Flora Bacopoulou[1,2], MD, PhD, Dario Boschiero[3], PhD, & Prof. George P. Chrousos[1,2], MD, DSc.

1. Unit of Applied Research in Endocrinology & Diabetes, Athens University Medical School, Athens, Greece.
2. 1st Department of Pediatrics, Athens University Medical School, Athens, Greece
3. BIOTEKNA s.r.l., Venice, Italy.

Abstract

Background: Growth hormone is fundamental in skeletal growth during puberty, however detailed studies of body composition analyses in adolescents with GH deficiency on growth hormone therapy are scarce. Moreover, there are few studies on the psychologic aspects of hrGH therapy in this population.

Objective and hypotheses: In this case-control study, we investigated differences in body composition based on bio-impedance measurements between adolescents with idiopathic growth hormone deficiency (GHD) who were treated with recombinant human growth hormone (rhGH) for at least 6 months (treatment group) and adolescents with idiopathic short stature who had not received rhGH as yet (control group).

Method: Participants were evaluated for short stature and underwent dual frequency bio-impedance assessment with the use of the BIA-ACC, BIOTEKNA© device. The questionnaires QUALISSY-C and CODI for short stature coping were distributed in both groups.

Results: Over a period of 1.5 years, 13 adolescents (10 males, 3 females; mean age±SD: 12.66±2.46 years) on rhGH treatment and 12 controls (7 males, 5 females; mean age±SD: 13.38±2.02 years) matched for age, height, body mass index (BMI) and bone age, were enrolled. Total (p=0.047) and extracellular (p=0.038) water volumes were significantly increased in the treatment group. Body cell mass protein (p=0.023), extracellular fluid protein (p=0.022), bone mass (p=0.038), soft tissue mineral content (p=0.016) and body calcium (p=0.017) were increased, along with increased metabolism of the bones (p=0.016) and skeletal muscles (p=0.022). Interestingly, no statistically significant differences in fat mass and in the QOLISSY-C and CODI questionnaires were found between the two groups.

Conclusion: Bio-impedance analysis is a potent, non-invasive tool for assaying body composition, confirming the expected beneficial changes of rhGH treatment. The lack of differences in the psychometric questionnaires may reflect the negative effects of short stature in both groups.

Objectives

Growth hormone (GH) is indispensable for linear growth and several other key metabolic processes. GH plays an important role in the achievement of a complete body development, including body composition, muscle mass maturation, full skeletal mineralization and reproductive maturation[1]. Also, there is a vast gap of knowledge, concerning life quality in adolescents, who receive GH replacement therapy. In this case-control study, we investigated differences in body composition based on bio-impedance measurements between adolescents with idiopathic growth hormone deficiency (GHD), who were treated with recombinant human growth hormone (rhGH) for at least 6 months (treatment group) and adolescents with idiopathic short stature, who had not received rhGH as yet (control group). Last, we evaluated the life quality and disease coping differences between the aforementioned groups.

Methods

Study design-Setting

It is a cross-sectional study, which was conducted in the Unit of Applied Research in Endocrinology & Diabetes, Athens University Medical School, Athens, Greece between September 2014 and May 2015. The study was approved by the Ethics Committee of Athens University Medical School, Athens, Greece and conformed to the Helsinki Declaration for human studies.

Participants

Adolescents, males and females, aged 10 - 19 years, with idiopathic Growth hormone deficiency, who were treated with recombinant human growth hormone (rhGH) for at least 6 months (treatment group) and adolescents with idiopathic short stature who had not received rhGH as yet (control group).

Variables-Measurements

BIA measurements

Bioelectric impedance analysis was performed with the BIA-ACC device (BIOTEKNA, Inc., Venice, Italy). This device applies alternating currents using two different frequencies, 50 and 1.5 kHz (bi-frequency measurement method), to measure body composition based on a multi-compartment model (2C, 3C, 4C, 5C). The individual lies supine on a flat surface that is non-conducting electrically, while there is no contact with metallic elements. Two electrodes are applied on the dorsal surface of the right hand and two electrodes on the dorsal surface of the right foot. The formulas used for computations have been previously described in detail. This method is bloodless, simple and rapid, does not require skilled staff, is relatively inexpensive, and does not expose patients to radiation. The BIA-ACC device distinguishes between healthy and diseased populations and has been validated in an earlier study of a very large number of participants[2].

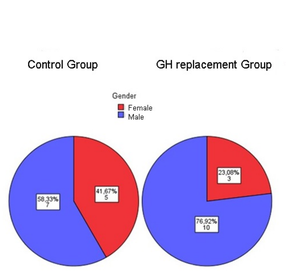
Quality of Life in Short Stature Youth - QOLISSY-C Questionnaire

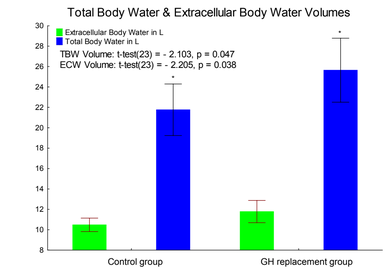
The QOLISSY questionnaire was developed as a patient reported instrument for short stature children (8-12 y) and adolescents (13-18 y) with growth hormone deficiency or idiopathic short stature. It consists of three core dimensions (Physical, Social & Emotional QoL) with 22, 5-point Likert-scaled, items and three additional domains (Coping, Attitude & Treatment QoL) with 28, 5-point Likert-scaled items, from 'not at all/never' (0 points) to 'Extremely/Always' (4 points). The scores are transformed from raw on the 5-point Likert scale to scores from 0 to 100. Higher scores indicate a higher quality of life[3].

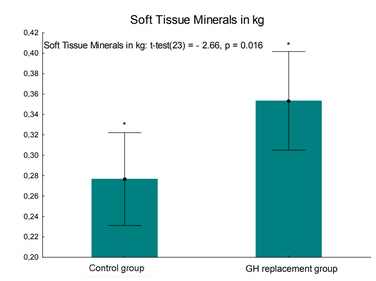
CODI Questionnaire

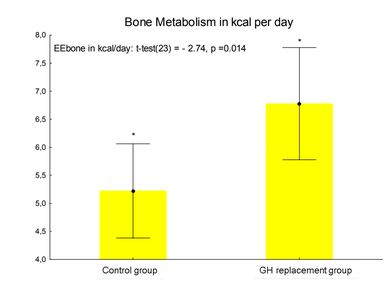
The CODI questionnaire was developed to evaluate coping strategies between children and adolescents (8-18 y) with chronic diseases. It consists of 29 5-point Likert-scaled items of six domains: Acceptance, Avoidance, Cognitive–Palliative Coping, Distance, Emotional Reaction and Wishful Thinking. The scores are transformed from raw on the 5-point Likert scale from 1 to 5, to scores from 0 to 100. A higher score is associated with a more frequent use of the coping strategies[4].

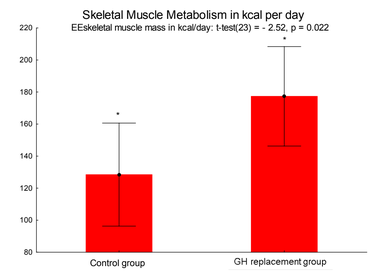
Results

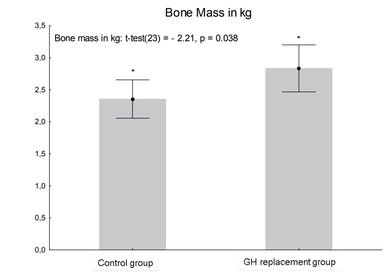












Conclusions

Our results have demonstrated the anabolic effects of GH in the group, receiving hormonal replacement, while, also, confirmed the expected beneficial changes in body composition. These findings were associated with increased metabolism of bone and skeletal muscle tissue. The lack of differences in the psychometric questionnaires may reflect the negative effects of short stature in both groups and the lack of systematic psychologic follow-up of the patients with short stature. Bio-impedance analysis seems to be a potent, non-invasive tool for assaying body composition, confirming the expected beneficial changes of rhGH treatment.

References

1. Cappa M, Caruso M, Saggese G, Salerno M, Tonini G. GH therapy in transition age: state of the art and future perspectives. Minerva Endocrinol. 2015 Mar;40(1):23-35.
2. Tsigos C, Stefanaki C, Lambrou GI, Boschiero D, Chrousos GP. Stress and inflammatory biomarkers and symptoms are associated with bioimpedance measures. Eur J Clin Invest. 2015 Feb;45(2):126-34.
3. Silva N, Bullinger M, Quitmann J, Ravens-Sieberer U, Rohenkohl A; QoLISSY Group. HRQoL of European children and adolescents with short stature as assessed with generic (KIDSCREEN) and chronic-generic (DISABKIDS) instruments. Expert Rev Pharmacoecon Outcomes Res. 2013 Dec;13(6):817-27.
4. Petersen C, Schmidt S, Bullinger M; DISABKIDS Group. Brief report: Development and pilot testing of a coping questionnaire for children and adolescents with chronic health conditions. J Pediatr Psychol. 2004 Dec;29(8):635-40.

ESPE 2015 427-P2
GH and IGF Treatment
Charikleia Stefanaki
DOI: 10.3252/pso.eu.54espe.2015
Poster presented at: 54th Annual Meeting 1-3 October ESPE 2015 BARCELONA European Society for Paediatric Endocrinology