

TRANSGENDER HEALTH

Early Hormonal Treatment Affects Body Composition and Body Shape in Young Transgender Adolescents



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ABSTRACT

Background: Transgender adolescents aspiring to have the body characteristics of the affirmed sex can receive hormonal treatment. However, it is unknown how body shape and composition develop during treatment and whether transgender persons obtain the desired body phenotype.

Aim: To examine the change in body shape and composition from the start of treatment with gonadotropin-releasing hormone agonists (GnRHa) until 22 years of age and to compare these measurements at 22 years with those of age-matched peers.

Methods: 71 transwomen (birth-assigned boys) and 121 transmen (birth-assigned girls) who started treatment from 1998 through 2014 were included in this retrospective study. GnRHa treatment was started and cross-sex hormonal treatment was added at 16 years of age. Anthropometric and whole-body dual-energy x-ray absorptiometry data were retrieved from medical records. Linear mixed model regression was performed to examine changes over time. SD scores (SDS) were calculated to compare body shape and composition with those of age-matched peers.

Outcomes: Change in waist-hip ratio (WHR), total body fat (TBF), and total lean body mass (LBM) during hormonal treatment. SDS of measures of body shape and composition compared with age-matched peers at 22 years of age.

Results: In transwomen, TBF increased (+10%, 95% CI = 7–11) while total LBM (–10%, 95% CI = –11 to –7) and WHR (–0.04, 95% CI = –0.05 to –0.02) decreased. Compared with ciswomen, SDS at 22 years of age were +0.3 (95% CI = 0.0–0.5) for WHR, and 0.0 (95% CI = –0.2 to 0.3) for TBF. Compared with cismen, SDS were –1.0 (95% CI = –1.3 to –0.7) for WHR, and +2.2 (95% CI = 2.2–2.4) for TBF. In transmen, TBF decreased (–3%, 95% CI = –4 to –1), while LBM (+3%, 95% CI = 1–4) and WHR (+0.03, 95% CI = 0.01–0.04) increased. Compared with ciswomen, SDS at 22 years of age were +0.6 (95% CI = 0.4–0.8) for WHR, and –1.1 (95% CI = –1.4 to –0.9) for TBF. Compared with cismen, SDS were –0.5 (95% CI = –0.8 to –0.3) for WHR, and +1.8 (95% CI = 1.6–1.9) for TBF.

Clinical Implications: Knowing body shape and composition outcomes at 22 years of age will help care providers in counseling transgender youth on expectations of attaining the desired body phenotype.

Strengths and Limitations: This study presents the largest group of transgender adults to date who started treatment in their teens. Despite missing data, selection bias was not found.

Conclusions: During treatment, WHR and body composition changed toward the affirmed sex. At 22 years of age, transwomen compared better to age-matched ciswomen than to cismen, whereas transmen were between reference values for ciswomen and cismen. **Klaver M, de Mutsert R, Wiepjes CM, et al. Early Hormonal Treatment Affects Body Composition and Body Shape in Young Transgender Adolescents. J Sex Med 2018;15:251–260.**

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Key Words: Transgender Persons; Adolescent; Gonadotropin-Releasing Hormone Analogues; Cross-Sex Hormonal Treatment; Body Composition; Body Shape

INTRODUCTION

Adolescents with gender dysphoria aspire to have body characteristics that are similar to those of the affirmed sex. From 12 years of age, adolescents with male-to-female gender dysphoria, referred to as transwomen, and adolescents with female-to-male gender dysphoria, referred to as transmen, can be treated with gonadotropin-releasing hormone analogues (GnRHa) to suppress puberty. Subsequently, at 16 years of age and if the person still pursues gender-affirming treatment, cross-sex hormonal treatment (CHT) is added to induce the secondary sexual characteristics of the affirmed sex.¹

During puberty, with increasing sex steroid levels, girls develop more body fat that is deposited mainly in the gluteal and femoral region (so-called gynoid region).^{2,3} This leads to a female body shape with a low waist-to-hip ratio (WHR).^{3,4} Pubertal boys obtain more lean body mass (LBM) and store body fat mainly in the abdominal region (also referred to as the android region),³ resulting in a male body shape with a higher WHR than seen in girls.^{3,4} It is unknown how total and regional body fat, LBM, and body shape develop in transgender adolescents treated with GnRHa and CHT, and whether this results in a similar body composition and body shape as the affirmed sex in young adulthood.

Therefore, the 1st aim of this study was to examine the effects of treatment with GnRHa and CHT on total body and regional body fat, LBM, and body shape in adolescents with gender dysphoria. A 2nd aim of this study was to compare the achieved amount of total and regional body fat, LBM, and WHR of these transwomen and transmen at 22 years of age with reference values of the affirmed sex and to examine whether they obtained the desired body composition and body shape in young adulthood. A 3rd aim was to examine the influence of pubertal stage at start of treatment on the achieved body composition and body shape at 22 years.

METHODS

Study Design and Study Population

We retrospectively reviewed the medical records of all adolescents diagnosed with gender dysphoria (*Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision*⁵) at the VU University Medical Center (Amsterdam, the Netherlands) until December 2015. All persons who started hormonal treatment before 18 years of age, started the treatment protocol as described below,¹ had undergone whole-body dual-energy x-ray absorptiometry (DXA) during treatment, and

according to their age had their medical checkups in young adulthood (>20.5 years) were eligible for this study. Data obtained during routine medical checkups on anthropometry, laboratory measurements, and whole-body DXA were collected at 3 time points: start of GnRHa, addition of CHT, and result at 22 years of age (range = 20.5–23.5 years). The local ethics committee approved the study and the necessity for informed consent was waived.

Treatment Protocol

The treatment protocol, also referred to as the Dutch protocol, has been published in detail.¹ At a minimum age of 12 years and stage B2 (breast) for girls and Tanner stage G3 (genital) for boys, subcutaneous GnRHa 3.75 mg for 4 weeks was started. From 16 years of age, CHT was added with increasing doses to initiate pubertal development. Transwomen were prescribed oral 17 β -estradiol starting at 5 μ g per kilogram of body weight per day, which was increased by 5 μ g/kg per day every 6 months until the maintenance dose of 2 mg/day was reached. Transmen used initially mixed testosterone esters (Sustanon; Organon Pharmaceuticals, Oss, The Netherlands) intramuscularly starting at 25 mg per square meter of body surface area every 2 weeks, which was increased by 25 mg/m² every 6 months until the maintenance dose of 250 mg every 3 to 4 weeks was achieved. When GnRHa were started after 16 years of age, CHT was added after 3 to 6 months with a start dosage of 17 β -estradiol 1 mg/day or intramuscular Sustanon 75 mg/week. After 6 months, this was increased to 17 β -estradiol 2 mg/day in transwomen and Sustanon 250 mg every 3 to 4 weeks in transmen. From 18 years, patients were eligible for gonadectomy, after which treatment with GnRHa ceased. From the start of treatment, patients were advised to maintain a healthy lifestyle with sportive activities and an adequate calcium intake to prevent bone loss.

Anthropometry and Whole-Body DXA

At each visit, body height, body weight, waist circumference, and hip circumference were measured. Body height was measured to the nearest 0.1 cm using a Harpenden stadiometer. Body weight was measured while the subject wore only underwear without shoes to the nearest 0.1 kg. Body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared. Waist circumference, defined as the smallest abdominal circumference, and hip circumference, measured at the level of the trochanter major, were determined with a tape measure to the nearest 0.1 cm. From these 2 measurements, the

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