

Does Testosterone Treatment Increase Anger Expression in a Population of Transgender Men?

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ABSTRACT

Background: The acquisition of phenotypic male features in transmen with gender dysphoria requires testosterone treatment. The suppression of menses is 1 of the most desired effects. The relation between testosterone levels and human aggressive behavior has been described. However, the effects of testosterone on anger expression have been poorly investigated in trans-persons.

Aim: To assess the effects of testosterone treatment on anger expression in transmen using a validated self-report questionnaire (Spielberger's State-Trait Anger Expression Inventory-2 [STAXI-2]).

Methods: 52 transmen diagnosed with gender dysphoria were evaluated before (T0) and at least 7 months after (T1) initiation of continuous gender-affirming testosterone treatment. Sociodemographic characteristics, anthropometric parameters, diagnosis of psychiatric disorders, current psychopharmacologic treatments, and life events were investigated at T0.

Outcomes: STAXI-2 scores, serum testosterone, and estradiol levels at T0 and T1 were compared.

Results: Most of the sample (61.5%, $n = 32$) had no Axis I or II comorbidity. All subjects at T1 achieved significantly higher serum testosterone levels (5.67 ± 3.88 ng/mL), whereas no significant difference in estradiol levels was observed from T0 to T1. At T1 only 46.2% ($n = 24$) of the sample achieved iatrogenic amenorrhea, whereas most of the sample had persistent regular bleedings. A significant increase in STAXI anger expression and anger control scores from T0 to T1 was recorded. Patients with persistent bleedings and Axis I disorders seemed to have higher odds of expressing anger. However, circulating testosterone levels at T1 did not influence anger expression.

Clinical Implications: Interestingly, despite the increase of anger expression scores, during continuous testosterone treatment, there were no reports of aggressive behavior, self-harm, or psychiatric hospitalization.

Strengths and Limitations: A limitation to this study is that although the STAXI-2 is a well-validated instrument measuring anger expression, it is a self-report psychometric measure.

Conclusion: This study demonstrates that during 7 months of continuous gender-affirming hormonal treatment, anger expression and anger arousal control increased in transmen. Persistence of menstrual bleedings and Axis I disorders, but not circulating testosterone levels, were predictive of the increase in anger expression score. Continuous psychological support to transmen during gender-affirming hormonal treatment was useful to prevent angry behaviors and decrease the level of dysphoria. **Motta G, Crespi C, Mineccia V, et al. Does Testosterone Treatment Increase Anger Expression in a Population of Transgender Men? J Sex Med 2017;XX:XXX–XXX.**

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INTRODUCTION

Gender dysphoria (GD) is characterized by a strong discomfort between the gender assigned at birth and the expressed or experienced gender.¹ Transmen are persons who were assigned female at birth but identify as male.

Gender-affirming testosterone treatment is the milestone of medical care for transmen^{2,3}: its aim is to achieve serum

testosterone concentrations in the physiologic male reference range to induce and maintain body virilization and decrease female secondary sexual characteristics.

The most commonly used testosterone formulations in transmen are parenteral injections and transdermal formulations.

After nearly 6 months of testosterone treatment, changes in body composition with redistribution of body fat, increased muscle mass and strength, male-pattern body hair growth, and voice deepening have been reported. The suppression of menses is 1 of the most desired effects because of the high symbolic value attributed to cyclic menstrual bleedings.²

A large body of scientific evidence indicates the relation between circulating testosterone levels and human aggressive behavior,^{4–6} but no conclusive evidence for a direct causal link exists. In fact, testosterone could facilitate behaviors aimed at obtaining and maintaining power and dominance.⁷ However, the effects of testosterone in the human brain in the context of self-perception of anger are poorly investigated and most studies are conducted in non-representative samples.⁵ In 2012 Peterson and Harmon-Jones⁷ reported that increased testosterone, but not cortisol, levels were associated with the subjective experience of anger, although the exact mechanisms underlying this connection have not been clarified.

Anger is a clinically relevant emotion and has been usually defined as a unitary construct, but during the past 30 years a multifaceted conceptualization of anger, according to Spielberger's theory, has spread.⁸ Spielberger pointed out that anger can be understood as a momentary state (ie, how subjects feel at the moment) and as a trait (ie, how subjects feel in general). The distinction between state and trait anger, referred to as the State-Trait Anger Theory, has been repeatedly and empirically validated.^{9,10} Moreover, Spielberger recognized the importance of how these angry feelings are expressed and controlled.

Anger has been assessed in clinical and non-clinical populations. In general, a clinical population tends to experience anger more intensely and more frequently than the general population and is more inclined to express it outwardly by physically and verbally aggressive behaviors.^{11–15} Notably, no differences in anger control have been found between clinical and general populations.

Increased anger levels occur in a range of psychiatric and neurologic disorders and in intellectual disabilities.^{16–23}

The most commonly used instrument for anger measurement is Spielberger's State-Trait Anger Expression Inventory–2 (STAXI-2).¹⁵ The STAXI-2 is a self-report 57-item questionnaire that uses a 4-point rating scale to assess anger intensity at a particular time and how frequently anger is experienced, expressed, and controlled. The STAXI has been validated in different clinical and non-clinical populations and is considered a suitable instrument, with good psychometric properties (internal consistency of STAXI-2 scales and subscales = 0.73–0.95).^{24,25}

To our knowledge, no investigations on anger expression and control in transmen have been reported thus far. To date, it is unknown whether gender-affirming hormonal treatment could influence anger intensity or expression.

Thus, the aim of this longitudinal study was to evaluate anger level before and during gender-affirming testosterone treatment in a population of transmen.

METHODS

Study participants were 52 transmen men 28.3 ± 7.9 years old. All participants were recruited from our GD clinic (Interdepartmental Center for Gender Dysphoria in Molinette Hospital) in Turin, Italy from 2013 through 2015.

This longitudinal study included 2 different phases: before (T0) and 7 ± 1.5 months after (T1) the initiation of cross-sex hormonal treatment. These phases are described below.

Phase 1 (T0)

After a psychological and psychiatric evaluation performed by a mental health professional according to World Professional Association for Transgender Health (WPATH) Standards of Care,²⁶ all participants were diagnosed with GD according to the *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition*.

The psychological and psychiatric assessment also aimed to identify the presence of Axis I (mood disorders, anxiety disorders, substance abuse) or Axis II (in particular cluster B personality disorders) psychiatric or other mental disorders. Thus, the presence of psychiatric diagnosis, current psychopharmacologic treatment, and life events were investigated in all participants.

Sociodemographic (work, marital status, educational level) and anthropometric data were collected.

Before beginning gender-affirming hormonal treatment, all patients underwent a screening panel, including complete blood cell count and serum chemistry profile, and those with significant abnormalities in any of these parameters were excluded. In particular, 1 subject with a recently detected thyrotoxicosis was excluded.

The assessment of luteal phase basal serum total testosterone and 17β -estradiol levels also was performed in the hospital laboratory (Molinette Hospital, Turin, Italy) using a immuno-electro-chemiluminescence assay.

The analytic sensitivities (lower detection limit) were 0.025 ng/mL for serum total testosterone and 5.0 pg/mL for serum 17β -estradiol. Interassay coefficients of variation were 2.45% to 8.4% for serum testosterone and 2.3% to 6.2% for serum 17β -estradiol and intra-assay coefficients of variation were 1.2% to 4.7% for serum testosterone and 1.6% to 5.7% for serum 17β -estradiol.

All participants were requested to complete the Italian version of the STAXI-2 questionnaire.²⁷ The STAXI-2 is a 57-item

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