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Incidence of polycystic ovaries and androgen serum levels in women with borderline personality disorder

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ABSTRACT

Obesity, increased visceral fat and disturbed glucose metabolism have been found in borderline personality disorder (BPD) patients. These conditions are often associated with disturbed androgen metabolism. Elevated androgens in women are related to polycystic ovaries (PCO) and might have an impact on psychopathology. Thus, higher prevalence of PCO and elevated androgen levels are suspected in BPD. In the study, we examined 31 BPD patients and 30 healthy controls ultrasonographically for PCO and measured their serum levels of androgens and interacting hormones. Furthermore, influence on psychopathology of free testosterone (FT) serum level was assessed. PCO was significantly more prevalent in BPD patients (30.4%) compared to healthy controls (6.9%). Testosterone, FT, androstenedione (A), and 17α-hydroxyprogesterone (17-OHP) were significantly elevated in the BPD group independently of BMI. FT serum level significantly correlated with depressive symptoms. In summary, our data suggest a disturbed androgen metabolism in BPD patients.

1. Introduction

Recent research on borderline personality disorder (BPD) has focused on comorbid medical conditions, especially obesity and obesity-related chronic medical disorders (Kahl et al., 2006; Frankenburg and Zanarini, 2006). Obesity and associated metabolic alterations appear to be linked to BPD as indicated by increased visceral fat and reduced insulin sensitivity in BPD patients (Kahl et al., 2005). Female obesity is often associated with profound alterations in androgen metabolism (Pasquali, 2006), which might have corresponding psychopathological effects (Archer, 2006). Women with central obesity have lower sex hormone-binding globulin (SHBG) than women with peripheral obesity or normal weight (Pasquali et al., 1990). Reduction of circulating SHBG increases metabolic clearance and production of SHBG-bound steroids, e.g. testosterone (Kirschner et al., 1990). Also, production rates and metabolic clearance rates of other androgens, such as dehydroandrosterone (DHEA) and androstenedione, are increased in obesity (Pasquali, 2006). Hyperandrogenemia in women is often related to polycystic ovary syndrome (PCOS) Norman, 2002 and PCOS is linked to obesity in women (Gambineri et al., 2002). The exact causality of these associations remains unknown. Thus, some data argue for a primary abdominal fat deposition with hyperinsulinemia and secondary hyperandrogenemia and cyst formation, whereas more recent data suggest a primary androgen excess with secondary visceral fat deposition (Escobar-Morreale and San Millán, 2007).

There is also evidence that some of the psychopathological symptoms frequently found in BPD are linked to altered serum androgen levels (Archer, 2006; Hermans et al., 2008). A number of studies, but not all, have demonstrated a positive correlation of serum testosterone (T) and aggressive behavior in animals and, to a lesser degree, in humans within both sexes (Rubinow and Schmidt, 1996; Archer, 2006). Thus, adolescent girls with aggressive conduct disorders showed higher level of FT and lower

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level of SHBG compared to healthy controls (Pajer et al., 2006). Among female prisoners, higher levels of T corresponded to increased levels of aggressive dominance and violent behavior (Dabbs and Hargrove, 1997). Finally, endogenous T was higher in bulimic women compared to controls (Sundblad et al., 1994; Cotrufo et al., 2000; Naessén et al., 2006). In one of the latter studies, plasma T correlated positively with aggression (Cotrufo et al., 2000). In summary, these findings suggest a role of elevated T in the symptomatology of disorders with impaired impulse control in women. Nevertheless, the data on aggression and testosterone are conflicting. With respect to the effect of exogenous T, some researchers conclude that an effect of T on human aggression is evident only at pharmacological (i.e., unphysiologically high), rather than at physiological (i.e., replacement), dose levels of the hormone (e.g. Rubinow and Schmidt, 1996). Also, androgen serum levels seem to be associated with mood. Although there are few studies at present, increased and decreased testosterone levels were associated with depressive symptoms in women (Rohr, 2002; Weiner et al., 2004).

2. Objectives of the study

In the current study, we examined serum androgen concentrations and PCO-status using ultrasound in women with BPD and healthy controls. Further, the study aimed to examine whether psychometrically measured psychopathology of BPD correlates with serum free testosterone concentrations. Thus, the objective of the study was to evaluate the role of an altered androgen metabolism for diagnosis and symptom profiling in BPD.

3. Materials and methods

3.1. Subjects

Forty-one patients with the diagnosis of borderline personality disorder (BPD) according to the DSM-IV fulfilled the inclusion criteria; 31 patients agreed to participate in the study and 27 of them agreed to the pelvic ultrasound examination. As controls, 30 healthy participants were included. All patients were admitted to our specialized inpatient treatment program for BPD during which they were consecutively recruited into the study between October 2005 and March 2007. Prior to admission to the inpatient program, all of them were on a waiting list and none was admitted for acute care. Patients were not reimbursed for study participation and had no advantage or disadvantage by participating in the study. Healthy controls were recruited via media advertisements and reimbursed for participation with 50€.

Axis II diagnoses were confirmed or excluded in patients and controls with the German version of the Structured Clinical Interview for DSM-IV (SCID II), axis I diagnoses were assessed with the German version of the Mini International Neuropsychiatric Interview (MINI). Axis I and II interviews were performed by trained psychiatrists or psychologists. Interviewers were not blinded and were aware of the status of the participant (patient or control). The study was approved by the ethics committee of the Charité-Universitätsmedizin Berlin. All participants provided written informed consent after having received a thorough explanation of the study.

Exclusion criteria for the patients were anorexia nervosa, oligophrenia, schizophrenia, hormonal contraception within the last six months, pregnancy, alcohol or substance abuse within the last three months, valproate medication within the last three years, and age younger than 18 years. Psychiatric disorders in the control group were also excluded by SCID II and MINI. Sociodemographic parameters of patients and controls are presented in Table 1.

Table 1
Sociodemographic data and psychometric measures in patients with borderline personality disorder and healthy controls.

	Patients ($N = 31$) Mean ± SD	Controls ($N = 30$) Mean ± SD
Age	29 ± 6.7	28 ± 4.3
ZAN-BPD sum	15.1 ± 4.3**	0.9 ± 1.2
Affective	5.4 ± 1.6**	0.5 ± 0.9
Cognitive	3.6 ± 1.6**	0.1 ± 0.3
Impulsivity	2.5 ± 1.2**	0.1 ± 0.3
Relations	3.6 ± 1.5**	0.2 ± 0.6
HAMD	11.2 ± 4.9**	1.9 ± 1.7
EDI-2 (bulimia subscale)	3.3 ± 1.6**	1.5 ± .5
FAF sum	23.6 ± 7.8**	8.5 ± 5.9
Spontaneous	7.0 ± 4.2**	2.2 ± 1.9
Reactive aggression	5.8 ± 2.5**	1.9 ± 2.3
Irritability	10.7 ± 2.4**	4.4 ± 3.0
Self-aggression	10.0 ± 1.0**	2.3 ± 2.0
Aggression inhibition	6.6 ± 2.0**	5.1 ± 1.8
BIS sum	88.4 ± 12.5**	73.8 ± 8.5
Cognitive	30.3 ± 3.9**	24.4 ± 3.9
Motor	28.9 ± 5.7**	23.1 ± 3.6
Non-planning	29.2 ± 5.8*	26.3 ± 3.4

ZAN-BPD, Zanarini Rating Scale for Borderline Personality Disorder; HAMD, Hamilton Depression Scale; EDI-2, Eating Disorder Inventory-2; FAF, Questionnaire for Measuring Factors of Aggression; BIS, Barratt Impulsiveness Scale.
* $p < 0.05$.
** $p < 0.01$.

About 19 of the 31 patients had recurrent Major Depressive Disorder (MDD) and 13 fulfilled the criteria of actual MDD. Ten patients fulfilled criteria for dysthymia, nine for agoraphobia or panic disorder, nine for social phobia, three for obsessive–compulsive disorder, ten for alcohol abuse within the past 12 months, 12 for substance abuse within the past 12 months, and 14 for bulimia.

During the study, 16 patients received SSRI, mainly for the treatment of MDD, affective symptoms in BPD or impulsivity. Ten patients received atypical neuroleptics (aNL) for the treatment of impulsivity and affective symptoms. Nine patients were without medication and five patients received aNL and SSRI. The patients did not receive further psychotropic concomitant medication. Two patients with BPD reported valproate intake in the past (more than three years ago), in both cases for less than four months. No patient had documented valproate intake in the medical records. No women from the control group received any medication within the last three months.

3.2. Psychometric instruments

Borderline pathology was assessed with the Zanarini Rating Scale for Borderline Personality Disorder (ZAN-BPD), a clinician-administered scale for the assessment of change in DSM-IV borderline psychopathology. The scale measures psychopathology over the last week. Each of the nine criteria for BPD is rated on a five-point anchored rating scale from 0 to 4, yielding a total score of 0–36 (Zanarini et al., 2003). Depressive symptoms were assessed with the 17-item Hamilton Depression Scale (HAMD). Impulsivity was assessed with the Barratt Impulsiveness Scale (BIS) version 10 Barratt, 1985, measuring motor, non-planning and cognitive components of impulsivity on a four-point anchored rating scale from 1 to 4. The Questionnaire for Measuring Factors of Aggression (FAF) Hampel and Selg, 1975, a German adaptation of the Buss–Durkee Hostility Inventory (Buss and Durkee, 1957), was used to evaluate various components of aggressive behavior, such as spontaneous and reactive aggression, irritability, self-aggression, openness, and aggression inhibition. Bulimic symptoms were assessed with the bulimia subscale of the Eating Disorder Inventory-2 (EDI-2) Garner, 1991.