Antipsychotic treatment and sexual functioning
Knegtering, Henderikus

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Document Version
Publisher's PDF, also known as Version of record

Publication date:
2003

Link to publication in University of Groningen/UMCG research database

Citation for published version (APA):

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Chapter 5

A Randomized Open-Label Study of the Impact of Quetiapine versus Risperidone on Sexual Functioning

Authors:
Rikus Knegtering, M.D.* Stynke Castelein, M.Sc.* Han Bous, BA* Just van der Linde, M.D.** Richard Bruggeman, M.D., Ph.D.* Herman Kluijter, M.Sc., Ph.D.*
Robert J. van den Bosch, M.D., Ph.D.*

Author affiliations:
* University Hospital Groningen and ** Center for Mental Healthcare Adhesie, Deventer


This study was supported with an unconditional grant by AstraZeneca.

Summary

Objective:
To compare sexual functioning in patients treated with quetiapine or risperidone.

Method:
This open-label study included patients with schizophrenia or a related psychotic illness who were randomised to quetiapine (200-1200 mg/day) or risperidone (1-6 mg/day) for 6 weeks. Sexual dysfunction was assessed by a semi-structured interview, the Antipsychotics and Sexual Functioning Questionnaire (ASFQ), based upon the Utvalg for Kliniske Undersogelser (UKU).

Results:
Four of 25 quetiapine-treated patients (16%) and 12 of 24 risperidone-treated patients (50%) reported sexual dysfunction (Chi-squared=6.4; df=1; p=0.006) on the ASFQ. Six patients (11.7%; 4 on risperidone, 2 on quetiapine) spontaneously reported sexual dysfunction. The mean ± SD dose was 580±224 mg/day for quetiapine and 3.2±1.3 mg/day for risperidone. Mean ± SD prolactin levels in quetiapine- and risperidone-treated patients were 13.8±17.9 ng/ml and 57.7±39.7 ng/ml, respectively. Conclusion: Sexual dysfunction was less common in patients treated with quetiapine than with risperidone. Direct questioning about sexual functioning is necessary to avoid underestimating the frequency of sexual side effects in patients with schizophrenia and related psychotic disorders.
Introduction

Sexual dysfunction in patients with schizophrenia seems to be related to the disease itself, psychosocial factors, medical health, and to the use of psychotropic medications (Aizenberg et al. 1995; Dickson and Glazer 1999; Peuskens et al. 1998). Many of the conventional or typical antipsychotics have been associated with sexual dysfunction, such as decreased libido, erectile dysfunction, anorgasmia, delayed or retrograde ejaculation, oligomenorrhoea, and amenorrhoea (Dickson et al. 2000; Ghadirian et al. 1982; Segraves 1989; Sullivan and Lukoff 1990).

Sexual dysfunction is rarely reported spontaneously by patients (Riley and Riley 1993); therefore, clinical trials of antipsychotic medications that rely on spontaneous reporting by patients to assess side effects, report low frequencies of sexual dysfunction. In contrast, studies using structured interviews or questionnaires result in 30-60% of patients with schizophrenia reporting sexual dysfunctions (Dickson et al. 2000; Knegtering et al. 2003; Sullivan and Lukoff 1990). The National Schizophrenia Fellowship in the United Kingdom conducted a survey of over 2000 mental health service users, and found that amongst many side effects patients experience, sexual side effects were deemed to be the most troublesome (Smith et al. 2002).

The pathomechanisms of antipsychotic-associated sexual dysfunction in patients with schizophrenia remain poorly understood (Meston and Frohlich 2000). All antipsychotics can cause elevation of the anterior pituitary hormone prolactin, although they differ in the magnitude of this effect (Alexiadis et al. 2002; Ghadirian et al. 1982; Kaneda 2001; Kapur et al. 1998; Kapur et al. 2000; Kapur et al. 2001; Kapur and Seeman 2001). Neuroleptic-induced Hyperprolactinemia (NIHP) has been associated with a number of side effects including galactorrhoea, menstrual disturbances, amenorrhoea, and sexual dysfunction (Dickson and Glazer 1999; Ghadirian et al. 1982). Although comparative studies are rare, antipsychotics may differ in type and frequency of associated sexual dysfunction (Kotin et al. 1976; Smith et al. 2002).

The atypical antipsychotics, other than risperidone and amisulpride, do not appear to cause sustained elevation of prolactin levels, and the limited reports available suggest that patients prescribed these agents might have lower rates of sexual dysfunction than with conventional antipsychotics (Aizenberg et al. 1995; Aizenberg et al. 2001; Arvanitis and Miller 1997; Dickson and Glazer 1999; Knegtering et al. 2003). Quetiapine-treated patients have been shown to exhibit a lack of increase in prolactin levels, or a reduction to levels similar to those observed with placebo, and might have a low incidence of sexual dysfunction (Borison et al. 2002; Dev and Raniwalla 2000; Small et al. 1997). At risperidone’s recommended dose range of 3-8 mg/day, significant and sustained prolactin elevation has been reported (Claus et al. 1992; Knegtering et al. 2000).

In previous studies, we found a higher incidence of sexual dysfunction and significantly higher prolactin levels in patients treated with risperidone compared with those treated with typical antipsychotics and olanzapine. Here we present an open-label randomised study, comparing the effects of risperidone and quetiapine on sexual dysfunction and serum prolactin levels were compared in patients with schizophrenia or related illnesses.
Patients, assessments and statistics

Patients
Study participants included in- and out-patients with schizophrenia or a related psychosis like schizotypal, schizo-affective or brief psychotic episode, who either needed for the first time treatment with antipsychotics or were to be switched to a new antipsychotic for clinical reasons as determined by the attending psychiatrists. These clinical reasons were an untreated psychotic episode, insufficient response to treatment with antipsychotic medication, or serious side effects during treatment with the previous antipsychotic. To exclude the effects of aging on sexual performance, only patients between 16 and 40 years could enter the study (Smith et al. 2002).

Written and oral consent were given by patients in accordance with the local ethical committee for research. Patients could be taking any antipsychotic before entering the study, except depot neuroleptics, quetiapine or risperidone. Patients being treated with other medications with known effects on sexual functioning, such as selective serotonin re-uptake inhibitors, could not participate in the study (Rosen et al. 1999). Patients were randomised to treatment with either open-label quetiapine (dosage increased from 50 mg/day to 400 mg/day over 3 days) or risperidone (starting dose 1 mg). In case previous to the study antipsychotics were used, the dosage was tapered down within the first three weeks of the study. In both groups, the dosage of the studied antipsychotics could be adjusted as deemed necessary by the clinician on a weekly basis (quetiapine 200-1200 mg/day; risperidone 1-6 mg/day). The patients were informed that effects of the switch would be assessed but they were blinded in regard to the hypothesis to be tested.

Assessments
Sexual dysfunction was assessed 6 weeks post-randomisation using a semi-structured interview: the Antipsychotics and Sexual Functioning Questionnaire (ASFQ), based upon the items of the Utvalg for Kliniske Undersogelser (UKU) administered by 6 trained physicians (Lingjaerde et al. 1987; Knegtering and Castelein 2001). The ASFQ was used in our previous studies and includes items assessing sexual side effects (libido, orgasm, and galactorrhoea. For men, it includes erection and ejaculation, and for women it includes vaginal lubrication and menstruation). Baseline sexual functioning was not assessed at Week 1, because many patients were psychotic and some were considered too ill at study entry to participate in the assessment. For both men and women, a severity score was created for libido and orgasm according to the ASFQ. Each dysfunction could be rated as absent (0 points), giving some problems (1) or giving many problems (2). Severity scores could theoretically vary from -4 (much improved on libido and orgasm) to +4 (most serious sexual dysfunction). A second severity score was developed including libido, erection, orgasm, and ejaculation (range -8 to +8). For women a severity score including libido, vaginal lubrication, and orgasm was developed (range -6 to +6).

At Week 6, premorbid social and sexual functioning were evaluated using a subscale of the Dickson-Glazer Scale for Assessment of Sexual Functioning of Patients on Antipsychotic Medications (DGSF) (Dickson et al. 2001). In this
subscale most important aspects of social and sexual functioning are assessed on a lifetime bases. Medication compliance was assessed by interviewing the patients for compliance, and by plasma antipsychotic level monitoring. Antipsychotic, prolactin and testosterone serum levels were measured at week 6 in the morning, but not at baseline, as carry-over effects from previous antipsychotic therapy would obscure interpretation of these data. By excluding patients treated with long-acting (depot) antipsychotics, the influence of carry-over effects from previous antipsychotics at Week 6 were minimised. Symptom severity was also assessed by independent raters using the Positive and Negative Syndrome Scale (PANSS) at baseline and Week 6 (Kay et al. 1987).

**Statistical analysis**

From previous studies it was hypothesised that patients treated with risperidone would report more sexual dysfunctions and higher prolactin levels than patients treated with quetiapine. The students t-test was used to analyse continuous outcomes including age, PANSS efficacy data, and prolactin levels, at the 2-sided α level of 0.05. Pearson’s chi-square test, if needed corrected for continuity, was applied to categorical outcomes. Prolactin level values were first normalised by converting them to their natural logarithm. The chi-square test was applied to categorical outcomes. The Mann-Whitney U test was applied for the severity scores. Of all the analyses of sexual dysfunction, the effects were one-sided tested with the significance-level at 0.05. For correlations between variables on the interval-level of measurement Pearson’s r was used; significance-testing was two-sided with α at 0.05.

**Results**

Sixty-six patients were eligible for the study and randomised. Five male patients randomised to risperidone treatment, and 3 to quetiapine never started medication, and required further clinical guidance. One man on risperidone and 3 women on quetiapine had second thoughts after giving informed consent. One male patient on quetiapine stopped treatment after one week for side effects not related to the study. One woman left the hospital for unknown reasons. One patient experienced a new psychotic episode despite treatment with quetiapine 1000 mg/day: the patient was withdrawn from the study, and the psychosis responded to treatment with clozapine.

Fifty-one patients (quetiapine, n=25; risperidone, n=26), including 15 women and 36 men, agreed to participate in this study and their data could be analysed (Table 1). The mean (± SD) age of the quetiapine group (26.5±5.4) was comparable to the risperidone group (25.2±7.3). Clinical diagnoses, according to DSM-IV were brief psychotic disorder (n=3), schizophreniform disorder (n=8), schizophrenia (n=29), schizoaffective disorder (n=2), delusional disorder (n=1), and psychosis not otherwise specified (n=7).

In both the quetiapine- and risperidone groups, 11 patients were included because of ongoing serious psychotic symptoms. Fourteen patients in the quetiapine group and 13 in the risperidone group were included because of intolerance to their previous antipsychotic medication. Eight patients in the quetiapine group and 7 in the risperidone group had not used any antipsychotic within 6 weeks of the start of
the study. In the quetiapine group, 9 patients had been treated with a conventional antipsychotic, and 5 with olanzapine before the study. In the risperidone group, 6 patients had been taking a conventional antipsychotic, and 7 had been taking olanzapine.

All patients initially randomised to receive either quetiapine or risperidone completed the 6 week study period: all patients reported to have taken their antipsychotic medication, and this was confirmed in all patients allowing blood sampling (n=44). At week 6, the mean dosages of quetiapine and risperidone were 580 (range 200-1200) mg/day and 3.2 (range 1-6) mg/day, respectively.

Premorbid and present sexual activity information was obtained at week 6. Nine patients reported being involved in an ongoing heterosexual relationship, 6 lived together with a partner, and 45 were single. Eleven patients had an ongoing sexual relationship with a partner, 26 reported to be sexually active through masturbation, and 20 said they had no sexual activity during the previous month. There were no statistically significant differences between patients treated with quetiapine or risperidone.

At the end of the study, patients were asked if evaluation of sexual side effects was important to them: 82% considered this an important assessment in a clinical trial. Patients who had been using antipsychotics before entering the study were asked if sexual side effects had been evaluated: 70% had never been asked for sexual side effect information.

Treatment outcome of psychotic symptoms

In 18 quetiapine-treated patients and 15 risperidone-treated patients PANSS scores (mean ± SD) were available for both Week 1 and Week 6. At start of the study no significant differences were found in the PANSS total scores between patients treated with quetiapine (65.2±23.0) or risperidone (65.3±21.1) (t=0.005; df=31; p=0.99). The reduction in PANSS total score was modest in this study: 5.4±12.3 in the quetiapine group, and 8.4±11.2 in the risperidone group (t=0.807; df=31; p=0.43), reflecting the fact that many patients switched to quetiapine or risperidone for intolerance of a former antipsychotic treatment. There were no significant differences in the PANSS total score, or in the positive, negative and general psychopathology subscore measures between the treatment groups.

Treatment outcome of sexual side effects

Although the majority of patients answered questions on the ASFQ without any difficulty, some could not reliably answer certain questions because they felt embarrassed or because it was difficult to be sure of the correct interpretation of the answer. The numbers show the number and percentage of the patients who reported clearly about sexual functioning. Sexual dysfunction was included in the calculation if patients reported dysfunctions that they attributed to use of the antipsychotic medication. Of the 51 patients who completed the trial, only 6 (11.7%) (4 risperidone and 2 quetiapine) reported sexual dysfunction (libido and/or orgasm) spontaneously. In response to the semi-structured interview (ASFQ), 16/49 (32.7%) reported sexual dysfunction (mild or severe). Only 4 of 25 quetiapine patients (16.0%) reported sexual dysfunction compared to 12 of 24
patients (50%) treated with risperidone (Chi-squared=6.4; df=1; p=0.01). Four patients on quetiapine (16%) and one on risperidone (4.1%) reported some improvement in libido or orgasm. The nature and frequency of sexual dysfunction is summarised in table 2. Using the severity scores, patients taking risperidone experienced more serious problems (on libido and orgasm) than patients using quetiapine (U=203.0; z=-2.2; p=0.01).

The mean (±SD) prolactin concentration was 13.6±17.9 ng/ml in the quetiapine group, and 57.9±39.7 ng/ml in the risperidone group (natural log t=7.704; df=42; p=0.000).

**Sexual dysfunction and prolactin levels in men**

The majority of patients were men. Twelve of 33 male patients (36.4%) reported sexual dysfunction attributable to their antipsychotic medication used during the study (Table 3). Sexual dysfunction (libido and/or orgasm) was more commonly reported in men treated with risperidone (8/14; 57.1%) versus quetiapine (4/19; 21.1%) (Chi-squared=4.5; df=1; p=0.02). Dysfunction of erection and ejaculation was also more commonly reported in men treated with risperidone (8/14; 57.1%) versus quetiapine (5/19; 26.3%) (Chi-squared=3.2; df=1; p=0.04). Using the severity score for men (including libido, erection, orgasm, ejaculation), risperidone-treated patients experienced more serious problems than quetiapine-treated patients (U=74.0; z=-2.3; p=0.01).

Mean (±SD) prolactin levels were significantly higher in male patients treated with risperidone (47.1±24.1 ng/ml) than in quetiapine-treated patients (12.1±10.1 ng/ml: natural log t=6.2; df=28; p = 0.000). In men, prolactin elevation was correlated with the severity score for sexual dysfunction (libido, erection, orgasm, ejaculation) (r=0.5; p=0.01) and with a decrease in orgasm (r=0.6; p=0.001). There was no significant correlation between serum prolactin and testosterone levels, nor were testosterone levels correlated with sexual dysfunction.

**Sexual dysfunctions and serum prolactin levels in women**

Female patients were a minority: 6 in the quetiapine group and 10 in the risperidone group. Although the numbers are small, we present their data in detail to enable further hypothesis development.

Four of 16 female patients (25%) reported sexual dysfunction attributable to their antipsychotic medication (Table 3). Sexual dysfunction (libido and/or orgasm) was only reported in women treated with risperidone (4/10; 40%) (Chi-squared=3.2; df=1; p=0.04).

Evaluation of sexual dysfunction (libido, orgasm and lubrication) was also more commonly reported in women treated with risperidone (4/10; 40%) versus quetiapine (0/6; 0%) (Chi-squared=3.6; df = 1; p = 0.03). Using the severity score (including libido, lubrication and orgasm), 3 risperidone-treated patients experienced more serious sexual side effects compared with quetiapine-treated patients (U=15.0; z=1.8; p=0.04).

Mean (±SD) prolactin levels were higher in female patients treated with risperidone (78.1±55.4 ng/ml) than in quetiapine-treated patients (18.0±21.5 ng/ml) (natural log t=4.0; df=12; p=0.001).
A randomized open label study of the impact of quetiapine versus risperidone

In male patients treated with risperidone, plasma drug levels correlated with ejaculation disturbance ($r=0.77$; $p=0.02$) and with the sum score for sexual dysfunction (libido, erection, orgasm, ejaculation) ($r=0.70$; $p=0.04$). The 9-hydroxy-risperidone metabolite and plasma prolactin levels did not show a significant correlation with plasma risperidone levels, nor with any sexual dysfunction or sum scores of these dysfunctions. In male patients taking quetiapine, no correlations between plasma levels of quetiapine, prolactin or any sexual dysfunction were found. For women, the sample size was too limited to do further statistical analysis.

Discussion

As has been found in previous studies, relying on spontaneous reports underestimates the prevalence of sexual dysfunction in patients treated with psychotropic medications (Lingjaerde, Ahlfors, et al 1987 76/id). With prescribed psychotropic medications, physicians should be aware that sexual dysfunction occurs commonly in patients with psychotic disorders and that active questioning is required to elicit this sensitive information.

The risperidone-treated group reported significantly more sexual side effects than the quetiapine group. Prolactin levels were higher in patients taking risperidone than in those taking quetiapine. The findings of this prospective open-label randomised study of quetiapine and risperidone are consistent with prior studies and case reports of Hyperprolactinemia occurring in risperidone-treated patients, associating risperidone treatment with sexual dysfunction (Knegtering et al. 2003). The findings of increased risk and severity of sexual dysfunction in risperidone-treated patients are also consistent with those of our naturalistic study on typical antipsychotics, clozapine, olanzapine, quetiapine and risperidone (Knegtering et al. 2002).

Clearly, medication is not the only reason for sexual dysfunction: patients with schizophrenia experience more frequent sexual dysfunction, with or without medications (Aizenberg et al. 1995; Teusch et al. 1995). The difference in the incidence of sexual side effects between patients treated with quetiapine and risperidone is likely to be related to the pharmacological properties of these drugs. However, given the lack of baseline ratings and the relatively small numbers, we cannot exclude differences in function that predate randomisation. Nevertheless, significant differences in such a small sample size are considered important by many clinicians.

The mechanisms of sexual dysfunctions induced by antipsychotics are not well understood (Meston and Frohlich 2000). The quetiapine doses used in this study (200-1200 mg/day) are probably associated with a relatively low $D_2$ occupancy, while risperidone (2-6 mg/day) is associated with greater and more sustained $D_2$ occupancy (Alexiadis et al. 2002; Kapur et al. 1999; Kapur et al. 2000; Kapur and Seeman 2001). Since the dopamine system is involved in sexual arousal and the ability to experience pleasure, sustained blockade of this system might be one of the reasons for decreased libido and orgasm (Segraves 1989).

A secondary effect of dopamine blockade in the anterior pituitary is prolactin elevation. Prolactin elevation in patients with a prolactinoma is associated with amenorrhea, galactorrhea, erectile dysfunction, and possibly decreased libido (Pollack et al. 1992; Schwartz et al. 1982). However, the mechanism of sexual
dysfunction caused by prolactin elevation is not known. There is some evidence that prolactin elevation is related to a reduced capacity to create sexual fantasies, while nocturnal penile erections are not influenced (Carani et al. 1996). Other suggested mechanisms are the lowering of testosterone levels in response to prolactin elevations (Rinieris et al. 1989). We could not find a correlation between prolactin and testosterone levels. Other suggested mechanisms of prolactin elevation being correlated with sexual side effects are prolactin's influence on multiple dopaminergic sites in the brain, sometimes increasing and sometimes decreasing dopamine turnover, including that in the substantia nigra (Sobrinho 1993). Recently, physiological prolactin elevation has been found following orgasm in men as in women, correlated with post-coital inhibition of sexual behaviour after orgasm. This suggests that prolactin elevation might be involved in experiencing sexual satiety (Exton et al. 2000; Haake et al. 2002).

Apart from the dopaminergic and prolactin-linked mechanisms, risperidone and quetiapine both have α-adrenergic blocking properties (Leysen et al. 2000): α₁-adrenergic mechanisms may be involved in ejaculation disturbance (Segraves 1989; Shiloh et al. 1999). The volume of the ejaculate is reduced or absent while experiencing an orgasm, a condition often referred to retrograde ejaculation or aspermia (Girgis 1968; Shader and Elkins 1980). Indeed, some patients using either quetiapine or risperidone reported in response to our questionnaire a reduction in ejaculate volume: 14.3% versus 28.6%, respectively: the difference was not significant.

Limitations of this study are the open design and, especially in women, the small number of participants. Also the time frame of 6 weeks is short, considering that patients are often advised to take antipsychotics for many years. Evaluating sexual side effects and serum prolactin levels in long-term follow-up studies would provide patients and clinicians with important information. An improved design for future studies could be in stable patients with schizophrenia being switched to alternative treatment options in a double blind study design allowing baseline assessment of sexual and hormonal functioning. Although in this brief study all participants took their assigned medications, in our clinical experience drug-induced sexual dysfunction is often a reason for medication discontinuation or requests for treatment alternatives. We are not aware of any studies on the correlation between compliance and sexual side effects due to antipsychotic drugs. Studies suggest that clinicians tend to underestimate the frequency and importance of sexual side effects in patients with schizophrenia (Finn et al. 1990; Peuskens et al. 1998) and other psychiatric disorders (Singh and Beck 1997). Further research is required on sexual side effects induced by antipsychotics, the possible mechanisms involved and on the relationship of specific side effects on compliance.
A randomized open label study of the impact of quetiapine versus risperidone

Table 1. Demographic and illness characteristics (mean ± SD)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Quetiapine (n=25)</th>
<th>Risperidone (n=26)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>25.2±7.3</td>
<td>26.5±5.4</td>
<td>NS*</td>
</tr>
<tr>
<td>Sex (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>76</td>
<td>62</td>
<td>NS*</td>
</tr>
<tr>
<td>Female</td>
<td>24</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>Diagnosis (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brief Psychotic Disorder</td>
<td>4.0</td>
<td>7.7</td>
<td></td>
</tr>
<tr>
<td>Delusional Disorder</td>
<td>4.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Psychotic Disorder (NOS)</td>
<td>20</td>
<td>7.7</td>
<td></td>
</tr>
<tr>
<td>Schizoaffective Disorder</td>
<td>0.0</td>
<td>7.7</td>
<td></td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>60</td>
<td>57.7</td>
<td></td>
</tr>
<tr>
<td>Schizoprophreniform Disorder</td>
<td>12.0</td>
<td>19.2</td>
<td></td>
</tr>
<tr>
<td>PANSS** scores week 1 (mean ± SD)</td>
<td>65.21±23.01</td>
<td>65.25±21.05</td>
<td>NS*</td>
</tr>
<tr>
<td>Mean improvement on the PANSS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>improvement in week 6</td>
<td>5.39±12.34</td>
<td>8.37±11.22</td>
<td>NS*</td>
</tr>
</tbody>
</table>

NS = Not significant, * t-test, **PANSS= Positive and Negative Syndrome rating Scale

Table 2. Prolactin levels (mean ± SD) and sexual dysfunction in patients taking quetiapine or risperidone

<table>
<thead>
<tr>
<th>Variable</th>
<th>Quetiapine (n=25)</th>
<th>Risperidone (n=26)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prolactin (ng/ml)</td>
<td>13.8±17.9</td>
<td>57.9±39.7</td>
<td>0.000*</td>
</tr>
<tr>
<td>Type of sexual dysfunction (n (%))</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Decreased libido</td>
<td>4/25 (16)</td>
<td>9/24 (36)</td>
<td>0.05**</td>
</tr>
<tr>
<td>Decreased orgasm</td>
<td>1/21 (5)</td>
<td>7/23 (30)</td>
<td>0.01**</td>
</tr>
<tr>
<td>Sexual dysfunction (libido and/or orgasm)</td>
<td>4/25 (16)</td>
<td>12/24 (50)</td>
<td>0.006**</td>
</tr>
</tbody>
</table>

* t-test ** Chi-square

Table 3. Prolactin levels (mean ± SD) and sexual dysfunction in male and female patients treated with quetiapine or risperidone

<table>
<thead>
<tr>
<th>Variable</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quetiapine (n=19)</td>
<td>Risperidone (n=15)</td>
</tr>
<tr>
<td></td>
<td>p-value</td>
<td>p-value</td>
</tr>
<tr>
<td>Progesterone (ng/ml)</td>
<td>12.1±10.1</td>
<td>47.1±24.1</td>
</tr>
<tr>
<td>Type of sexual dysfunction (n (%))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decreased libido</td>
<td>4/19 (21)</td>
<td>6/15 (40)</td>
</tr>
<tr>
<td>Decreased erection</td>
<td>2/15 (11)</td>
<td>5/15 (33)</td>
</tr>
<tr>
<td>Decreased vaginal lubrication</td>
<td></td>
<td>0/5 (0)</td>
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<tr>
<td>Decreased orgasm</td>
<td>1/16 (6)</td>
<td>4/15 (27)</td>
</tr>
<tr>
<td>Ejaculation dysfunction</td>
<td>2/14 (14)</td>
<td>4/14 (29)</td>
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<tr>
<td>Sexual dysfunction (libido and/or orgasm)</td>
<td>4/19 (21)</td>
<td>8/14 (57)</td>
</tr>
</tbody>
</table>

* t-test ** Chi-square
A randomized open label study of the impact of quetiapine versus risperidone


Knegtering, H., Moolen, van der A.E.G.M., Castelein, S., Kluter, H., and Bosch van den, R.J., 2003. What are the effects of antipsychotics on sexual dysfunctions and endocrine functioning? Psychoneuroendocrinology. 28(S2), 109-123.


