Female Sexual Dysfunction and Schizophrenia: A Clinical Review

Pragya Lodha and Avinash De Sousa

Abstract
Female sexual dysfunction (FSD) is understudied and unexplored in clinical practice. There is a need for psychiatrists to acknowledge the same and explore this symptom in patients with schizophrenia. The following article is a clinical review that looks at various facets of FSD in relation to schizophrenia. The various types of FSD seen in schizophrenia are elaborated and factors that affect the same are discussed. The role of various factors and antipsychotic-induced FSD is also discussed. The role of estrogens in women with schizophrenia from a clinical and sexual perspective, the role of oral contraceptives in schizophrenia, schizophrenia and pregnancy related complications along with menopause, and its effect on schizophrenia and sexual function in these patients are discussed. The neurobiology of FSD is explored briefly along with the role of female sexuality in recovery and enhancing outcome in schizophrenia is also elaborated. The victimization of female patients with schizophrenia and future research needs in FSD in schizophrenia are laid out.

Keywords
Female sexual dysfunction, schizophrenia, menopause, pregnancy, estrogens, oral contraceptives

Introduction
Schizophrenia is a disorder characterized by a range of symptoms that involve disturbances in content and form of thought, distorted perception of reality, and impairment in affect, behavior, motivation, sense of self, and interpersonal functioning. The varied symptoms of schizophrenia, thus, include negative symptoms (functioning that is below the normal level of behavior) like restricted affect, avolition and asociality, and positive symptoms (exaggerations or distortions of normal behavior), like hallucinations, delusions, and disturbed speech and behavior, and inappropriate affect. The disorder lies on spectrum with a group of disorders called “schizophrenia spectrum disorders” that includes schizophreniform disorder, schizoaffective disorder, brief psychotic disorder (BPE), and delusional disorders. Unlike several other psychological disorders, schizophrenia is diagnosed entirely on the basis of case history and mental status examination.

Epidemiologically, the lifetime prevalence of the disorder has been posited at 7 per 1000. The sex ratio is tilted slightly in the direction of the males with the male to female ratio being 3:2. The etiological factors are multifaceted. Biologically, the positive symptoms reflected activated dopamine levels in the nervous system, whereas negative symptoms reflected brain abnormalities. The causation of schizophrenia is complex and authors have proposed a proposed a “developmental cascade” hypothesis that integrates the multifaceted etiological factors, like biological and genetic implicates, difficulties in prenatal through early childhood period and other adversities, that contribute in the development of schizophrenia.

The first line of treatment to ameliorate the symptoms of schizophrenia is using typical and/or atypical antipsychotic medications. These medications alleviate the symptoms by primarily acting on the dopamine receptor system and the sexual as well as metabolic and extrapyramidal side effects of antipsychotic medications are one of the leading causes of noncompliance to pharmacotherapy in patients with schizophrenia. Multiple sexual dysfunctions such as decreased sexual desire, erectile dysfunction, anorgasmia, and delayed or premature ejaculation have been linked to antipsychotic medications.

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The current review article looks at the various aspects of female sexual dysfunction (FSD) in schizophrenia and as we feel that this aspect in patients with schizophrenia has not been addressed though clinically very relevant.

Method of Conducting This Review

For identifying articles that focused on FSD and schizophrenia, the terms “schizophrenia”, “FSD”, “FSD and schizophrenia” were used. For identifying articles that focused on specific terms, like “estrogens”, “antipsychotics”, “menopause”, “pregnancy”, “oral contraceptives”, and other terms were used. These two search strategy results were combined with an “and” statement in the following data bases with the time frame being specified from 2000 to 2019. The databases used were Medline, Pubmed, Google Scholar, and the Cochrane Database on Systematic Reviews. In total, 231 articles were identified, which included reviews, mini reviews, original research papers, case reports, and some randomized controlled trials in female patients with schizophrenia. The randomized controlled trials reviewed were centered on those addressing FSD.

We included studies with sample sizes of more than 30 participants and only very relevant case reports. Statistically the studies reported either mean scores or percentages with appropriate statistical analysis. Both authors reviewed all of the articles and the most relevant ones were chosen for this review. This was supplemented with the personal clinical experience of both the authors who work regularly with this group of patients and have further insight into the problems faced by them. Both the authors are mental health professionals in full time private practice where they see a large number of female patients with schizophrenia on a regular basis.

Schizophrenia and Sexuality—An Overview

Sexual dysfunctions refer to abnormalities in an individual’s sexual responsiveness and reactions. These dysfunctions are usually categorized as arousal disorders, disorders involving orgasm, and disorders involving pain. They are seen in both genders and are often not addressed unless one asks the patient and the patient then responds to the clinical questioning of the patient. Sexual disturbances in individuals with schizophrenia are related to their medications, other associated psychological concerns self-stigmatization, anhedonia, and other negative symptoms as well as the sociocultural and marital context.

Case studies and case series have identified a relationship between sexuality and positive symptoms of schizophrenia. Individuals, in the acute phase of the disorder, have reported experiencing cenesthetic hallucinations of sexual nature, erotomanic delusions, delusions pertaining to sexual identity and hypersexualism (extremely frequent or suddenly increased libido), most of which disappear with the introduction of antipsychotic medications. Negative symptoms, like avolition, anhedonia, social withdrawal, etc, are also associated with lack of desire and/or arousal.

Unravelling and identifying the pure influence of the symptoms of schizophrenia on the sexual functionality of the individual is difficult as most patients with schizophrenia take antipsychotic or neuroleptic medicines that also influence sexual activity. Bains and Shah found that pharmacologically untreated patients of schizophrenia showed significantly less sexual dysfunctions compared to those who were treated with antipsychotic medications. Researchers have noted that anywhere between 16% and 60% (wide range of prevalence is explained due differing patient demographic factors and different study methods) of the patients using antipsychotics experience sexual dysfunctions. Alterations in the levels of estrogen, prolactin, and thyroxine have been implicated in female sexual arousal disorder in schizophrenia. Some studies have observed a discrepancy between prolactin-raising and prolactin-sparing antipsychotic drugs. Some studies report a 40% to 60% prevalence of hyperprolactinemia (which causes increased experiences sexual dysfunction) in patients with schizophrenia using prolactin-raising drugs, compared with 15% to 30% in those using prolactin-sparing drugs.

Other studies have noted that a poor and unstimulating environment such as a hospital can increase certain negative symptoms. This finding is important as institutionalization of individuals with schizophrenia is not uncommon and institutionalization is an obstacle to sexuality. It has been reported that patients with schizophrenia who were hospitalized took longer to have a first date, first kiss, first coitus, and first marriage. Researchers have reported that when compared with controls, institutionalized patient with schizophrenia, males and females, showed a deteriorated interest in sexual behaviors reporting diminished interest in sexual activity, lesser frequency of intercourse, and lack of satisfaction from sexual interactions.

Female Sexual Dysfunction in Schizophrenia—An Overview

Sexual desires and activities form an integral part in an individual’s life, defining their quality of life and overall functioning. In India, for women to disclose and discuss about the hindrances and distress that they experience pertaining to sexual dysfunctions is considered a taboo as a result of the male dominated society and puritanical mindset. This could be one reason why epidemiological investigations regarding FSDs in India, particularly are scant. A second reason for the limited focus on FSD as compared to those in males could be difficulty in appropriately measuring the dysfunction. It is only now, in the recent times that valid scales to assess female sexual desire like female sexual function index, for example, have come into existence. Thirdly, the models explaining the conceptualization of FSD...
are still evolving. From the conventional linear models of Masters and Johnson, Kaplan, and Leif to the contemporary nonlinear model of female sexual response by Basson, which integrates sexual intimacy with emotional intimacy, it has become clear that female sexual response cycle is more complex than male sexual response cycle. It has been noted that not all women experience sexual desire at the outset of sexual engagement. Many women usually are sexually neutral yet open to the idea of a sexual encounter, and it is only later during the experience that sexual desire gets aroused as one is aroused subjectively. Women report satisfactory outcomes of sexual experiences despite the frequent absence of the sexual desire in the beginning.

Therefore, the term hypoactive sexual-desire disorder in women is changed to female sexual desire/arousal disorder, which is a recurrent and consistent incapacity to trigger any desire and arousal and not the lack of desire before beginning the sexual activity. The fourth reason that is more pertinent to women suffering from schizophrenia is that among the other issues that are to be addressed, intimate sexual and interpersonal needs often get neglected. At times, clinicians avoid discussing about sexual health because of the fear of treading on sensitive ground or of arousing sexual delusions. A review by Cannon and Kramer estimates the prevalence of delusions about sex in patients with schizophrenia to be 15%.

Other factors that confound the findings related to FSD and schizophrenia are substance use, comorbidity with depression and anxiety, history of sexual trauma, other general medical conditions, like obesity and diabetes, marital status, etc. Though there may not be major differences in the kind of dyadic and individual sexual desires of women with and without schizophrenia, there might be significant differences in the level of experiential satisfaction. One reason for the said differences is women with and without sexual partners. Nevertheless, since the dysfunction applies to self-stimulation as well as to the interpersonal sex, it is important to address this concern for female patients of schizophrenia, both, who do and who do not have partners. Care must be taken to maintain the balance while attempting to enrich the individual’s environment so as to avoid the risk for inducing psychosis as a result of excessive stimulation or unrealistic expectations.

**Estrogens, Sexuality, and Schizophrenia**

There are proliferating literature reviews on the relationship between estrogens and schizophrenia. Most of the literature has focused on the role of estrogens in the causation and genesis of schizophrenia, gender differences in psychopathology, and symptoms of schizophrenia and estrogens as adjunct therapy for schizophrenia. Estradiol has definite roles with respect to these neurotransmitter systems in the brain such as the dopamine system that have been implicated in schizophrenia. Estrogens are also known to modulate glutamate neurotransmission and is proposed to have a role in promoting neuroplasticity and enhancing neuroprotection in schizophrenia. Many preclinical studies have shown the potential of estrogens in either enhancing and reversing deficits in cognition and memory that account for the symptoms of schizophrenia (positive, negative, and cognitive). Clinical trials conducted in recent times have provided promising findings on the use of estradiol and the contemporary use of selective estradiol receptor modulators likeRaloxifene, as an adjunctive treatment to antipsychotics for male and female patients of schizophrenia. What underlies the mechanisms of estradiol’s protective action in schizophrenia is far from clear. Further, there is a need to look at the gender differences in light of these findings. However, there is a scarcity of literature on the exact nature and role of estrogens in causing and maintaining sexual dysfunction in women that suffer from schizophrenia. There is also a dearth of literature on estrogens levels and sexual dysfunction in patients with schizophrenia. Hence, we have not been able to comment on the same. Estrogen being the major female sexual hormone was included in this review and other literature on estrogens and schizophrenia has been discussed.

**Antipsychotic-Induced Female Sexual Dysfunction**

There are several mechanisms by which antipsychotic drugs can cause sexual dysfunction, they include histamine receptor antagonism, dopamine receptor antagonism, dopamine D2 receptor antagonism, cholinergic receptor antagonism, and
alpha-adrenergic alpha receptor antagonism. Dopaminergic receptor antagonism if implicated to cause decrease in libido by inhibiting motivation and reward. Antipsychotics may also decrease the libido, impair arousal, and impair orgasm indirectly, by blocking dopamine D2 receptors in the tuberoinfundibular pathway, which leads to elevated prolactin levels. Alpha-adrenergic alpha receptor antagonism is found responsible for reducing peripheral vasodilation that causes decreased lubrication in women.

It is a well-known fact that hyperprolactinemia is a major cause of sexual dysfunction in women taking antipsychotics. Depending on the blockade of dopamine D2 receptors, haloperidol, risperidone, and amisulpride are classified as prolactin-elevating antipsychotics, while olanzapine, clozapine, quetiapine, ziprasidone, and aripiprazole are under the label of prolactin-sparing drugs.

In a study where haloperidol was administered to female patients, about 24% of patients complained of decreased libido, while 9.4% complained of arousal disorder and 8.1% complained of vaginal dryness. Amenorrhea and galactorrhea are the most common side effects seen with Risperidone that also cause menstrual disturbances and irregular cycles. Decreased libido and reduced vaginal lubrication have been reported with olanzapine, while least sexual dysfunction has been reported with clozapine. Quetiapine, aripiprazole, and lurasidone have been reported with the least sexual dysfunction in female patients.

Though there is a limitation in the clarification provided by literature on the influence of antipsychotics on sexual function, these studies suggest that the relative impact of antipsychotics on sexual dysfunction can be summarized as risperidone and typical antipsychotics are associated with a high rate of sexual dysfunction as compared to olanzapine, clozapine, quetiapine, and aripiprazole. Thus, through the appropriate choice of antipsychotics, it is possible to minimize the risk of sexual dysfunction.

Vaginal lubrication is the excretion of a lubricating fluid by the vaginal wall that facilitates sexual intercourse. It is associated with increased vaginal blood flow and sexual arousal. Although vaginal lubrication in women is viewed as the physiological equivalent of erection, but it has hardly been studied in relation to schizophrenia or treatment using antipsychotic medication. Studies have suggested that women report diminished frequency of lubrication, whereas men report diminished frequency of erectile dysfunction, both at a comparable level, while they were being treated with the same antipsychotics.

Orgasm is characterized by a peak in sexual pleasure accompanied by rhythmic contractions of the genital and reproductive organs, cardiovascular and respiratory changes, and a release of sexual tension. Physiological measurements of orgasm, like fluctuations in rectal pressure, are infrequently described and considered too invasive for use in clinical trials on patients using antipsychotics.

Improved sexual functioning for adjunctive therapy with drugs like aripiprazole, peony-glycyrrhiza decoction, cabergoline, amantadine, and imipramine was reported in open label studies. These studies also claimed improvement in sexual performance with a switch from strong dopamine antagonist antipsychotics (which often lead to elevated prolactin levels) to aripiprazole, ziprasidone, olanzapine, and quetiapine (prolactin sparing antipsychotics). The switch to aripiprazole was the most studied strategy. In summary, several strategies can be resorted to in order to reduce the antipsychotic-induced sexual dysfunction; among them are-lowering the dose, switching to a prolactin sparing antipsychotic, adding a dopamine agonist, aripiprazole or a PDE-5-inhibitor.

Role of Addressing Sexual Issues in Recovery From Schizophrenia

Women, being more social by nature (and developmentally), also have better social outcomes as patients with schizophrenia. Women, more often, go on a date, have sex, get married, and are more involved in raising children, than men. McEvoy’s study that looked at sexual activity and attitudes in chronic inpatients with schizophrenia, found that majority of female patients continued to be interested in sex. About one-half of them wanted to become pregnant, though many of them were unaware of their limited parenting abilities.

In a population with institutionalized patients compared with controls, both males and females with chronic schizophrenia showed diminished interest in sexual activity, decreased frequency of intercourse and loss of satisfaction from sexual interactions. The severity of psychopathology and the length of institutionalization were found to be related to lower frequency and lesser degree of satisfaction with sexual intercourse. Interestingly, there was no significant difference in the sexual dreams and fantasies among patients as well as the control group.

Sexual side effects majorly interfere with adherence to therapy and reduce the quality of life patients. Nonetheless, patients and clinicians do not easily discuss sexual functioning during sessions. Clinicians must realize that most patients are willing and relieved to discuss sexual problems when the initiation is made from the health expert. Studies debunk a misunderstanding that talking about sexuality does not destabilize patients but actually is helpful. Even those with treatment-resistant schizophrenia may wish to talk about these topics since it is an important area of functioning for the patient. Clinicians often fail to ask about these issues and consequently underestimate the rates of sexual dysfunctions as well as their negative impact on the lives of the patients. Some clinicians may be less aware about the issue or feel ashamed of talking about these sensitive subjects that are also considered taboo in several cultures.
When patients attribute sexual dysfunction only to medication, it reduces adherence to medication. It is important to consider with patients which factors are important in their individual situation, in case of a relationship this should be preferably explored together with their partner. Also, considering relevant influencing factors gives an indication about adequate treatment strategies.

Psychosocial treatment like sex-education, disorder-specific interventions, education about sexual risk behavior, prevention of unwanted pregnancies, abortion, and childrearing, and relationship counseling are additional helpful strategies.

Conception and Pregnancy in Female Patients With Schizophrenia

Pregnancy and the postpartum period are associated with psychiatric problems and a range of adverse consequences. Acute psychiatric relapse occurring during pregnancy is a leading contributor to maternal deaths during pregnancy and postpartum relapse affects capacity to parenting abilities and responsibilities towards the infant. Pregnancy is associated with discontinuation of psychotropic medication in women with severe affective disorders, but there little is known about rates and reasons for discontinuation in women with schizophrenia.

There is increasing evidence regarding adverse fetal outcomes, prematurity, and stillbirth that have found to be associated with schizophrenia and these outcomes are pinned due to risk factors associated with schizophrenia apart from other conditions like smoking and substance misuse, nutritional deficiencies, obesity, and domestic violence that the pregnant woman may have suffered.

Rates of obstetric complications are higher among women with schizophrenia than in the general population. It is unclear whether this is resultant of the condition of schizophrenia, or rather from associated risk factors that could be related to low socioeconomic status. The risk of obstetric complications is higher if the mother has schizophrenia than if the father has schizophrenia. Psychosis may contribute to several negative experiences such as delayed recognition of pregnancy, misinterpretation of somatic changes, lack of recognition of labor, attempts at premature self-delivery and precipitous delivery. However, the risk of obstetric complications is not solely accounted for by psychotic behaviors as these complications are apparent before the onset of psychosis.

Women with schizophrenia are less likely to receive prenatal care than women who do not have a psychiatric illness, when compared demographically. Additionally, among women who do receive prenatal care, psychiatric symptoms are often underreported, due to fear of custody loss. Thus, the opportunity to intervene decreases when such complications arise. What worsens the intervention among women with schizophrenia is the high rate of unplanned and unwanted pregnancies. Compared with controls who are not mentally ill, women with schizophrenia have a greater percentage of unplanned and unwanted pregnancies.

Oral Contraceptive Pills Usage in Female Patients With Schizophrenia

Infrequent use contraception is commonly seen in women with psychiatric illnesses. Consequently, the prevalence of sexually transmitted infections is high in this population. In addition, while the overall rate of pregnancy in women with schizophrenia of child-bearing age is lower than in the general population, the percentage of pregnancies that are unwanted is higher than that in the general population. As part of comprehensive care for women with psychiatric illnesses like schizophrenia, contraceptive counseling to the patient and their spouses is a priori. Women with schizophrenia who have comorbid psychosocial/medical conditions, like smoking, being overweight, diabetes, migraine, cardiovascular disease, or a family history of breast cancer, should be offered nonhormonal contraception. Barrier methods in addition to any other contraceptive measures should be prescribed to women with more than one sexual partners.Clinicians should be aware of potential interactions among oral hormonal contraceptives, smoking, and therapeutic drugs. Some reasonable options of contraception for women are long-lasting contraceptive methods, such as intrauterine devices, progesterone depot injections, or tubal ligation.

Family planning is compromised as a practice for women with schizophrenia resulting in high rates of unplanned and unwanted pregnancies. Surveys reveal that many sexually active women with severe psychiatric illnesses do not use birth control despite their decision of not wanting to be pregnant. Rudolph and others found that family planning and contraception were not mentioned in most charts of women with psychotic disorders who were hospitalized during pregnancies. Survey responses indicate that most female patients would like to have family planning counseling in mental health settings and that most mental health professionals agree that family planning information should be importantly provided to patients with mental illness.

Offering family planning services along with essential mental health services being provided at one clinic has several benefits for women, preventing formidable barriers to care for many patients. Furthermore, standard family planning may lack awareness and skilled provision of family plans on how schizophrenia affects informed consent.

Intrauterine devices may confer additional risk for women with schizophrenia as implants and intrauterine devices sometimes become a focus of delusions of control. For some patients, schizophrenia interferes with how patients perceive perception and they might ignore early signs of pelvic inflammatory disease, adding to further health risks.
For many women with schizophrenia, long-acting injectable hormonal contraception is optimal that mostly last for 3 months and do not clinically interfere with antipsychotic medication. For patients who want both antipsychotic treatment and contraception, receiving depot neuroleptic injections with contraceptive injections can be helpful as patients may forget taking medication on a daily basis.92

**Expression of Sexuality and Intimacy by Women Patients**

Historically, it has been sanctioned as a notion that women have been (were supposed to be) sexually innocent. Any sexual promiscuity, out of societal norm sexual behavior, women being single or sexually abused saw the way to asylums and representation as witches and madwomen in gothic literature. As ancillary records in literature, sexuality has been systematically departed from the lives of patients in asylums with celibacy as the accepted order. Interesting to note is also that much of Freud’s work delineates on infantile sexual origins of anxiety, which is a major symptom in schizophrenia.93

Kulkarni documented the broadening of the concept of schizophrenia where it has been discussed that in the era after World War I, women with schizophrenia became a central cultural figure, a symbol of linguistic, religion, and sexual breakdown.94

Sexuality encompasses the sexual desires, thoughts, and preferences of an individual that is influenced by biological, psychological, socioeconomic, cultural, ethical, and religious/spiritual factors. Sexuality plays an elemental role in the development of individual’s self as it is affected by age, physical health, partnered status, and the quality of intimate relationships, role responsibilities (such as paid and unpaid work), as well as religion and moral principles. This is also likely to be so for women with schizophrenia.95

Understanding sexuality in females must be sought with sensitive attention to the socio-cultural and psycho-political frameworks that have misconstrued the idea of sexuality as inferior for the sake of patriarchal dominance.96

**Hypersexuality and Hyposexuality as a Manifestation of Psychosis**

In accordance with the aforementioned, women with schizophrenia have a better social outcomes and relationships that encompass for longer lasting sexual relationships and rearing children than their male counterparts. Sexual concerns differ in males and females as the age of onset differs for both—women have a later age of onset (interestingly, males and females do not have a significant difference in age of onset and females with schizophrenia still show better functioning than males) and are shown to have greater interest in sex, more successful relationships and willingness to become pregnant—however, with a compromised ability to understand their parental responsibilities. However, social and interpersonal impairments do limit the development of stable sexual relationships in the long run for males and females.97

Hyposexuality and/or sexual dysfunction is often a consequence of the negative symptoms (avolition and anhedonia) of schizophrenia. Hypersexuality is seen sometimes in acute episodes of schizophrenia (which weans away with antipsychotic medication).98, 99 To note, these behaviors may be levied with element of criminal liability when assessing for sexually deviant and/or offending behaviors. However, the assessment and proceedings for the same must be looked with a forensic/criminal lens in order to confirm the same. Not all hypersexual behaviors are sexually deviant and/or offensive (sexually deviant behaviors consensually practiced are not criminal).100

On the other hand, there have also been accounts of hypersexuality and sexually disinhibited behaviors in patients with schizophrenia. Hypersexuality in psychosis may result directly from an increased sexual drive or sexual disinhibition that may be part of a more generalized behavioral disinhibition that may come with frontotemporal and limbic lobe pathology.101 Hypersexuality for women results in several negative consequences beyond acquiring of sexually transmitted infections, such as unwanted pregnancies, breakdown of romantic relationships, and retaliatory assault.102

**Role of Addressing Sexual Issues in Psychoeducation Programs**

Psychoeducation is an essential part of the management of mental illnesses, especially given the prevalent stigma. Addressing sexual issues calls for a greater attention considering it is another topic of taboo. Sexual concerns are important for patients; however, they are reluctant to address them directly with clinicians and nor do clinicians always address sexual concerns too. This underplay often leads to delayed treatment and nonadherence.103

Psychoeducation not only helps to create greater awareness around understanding mental illnesses but has several positive indicators in treatment process, such as better awareness and earlier identification of episodes, better prevention of relapse, increased adherence to psychotherapy and pharmacotherapy, and better overall rehabilitation. A helpful element of psychoeducation can sometimes also be administering self-report inventories and scales to assess sexual functioning, which allows patients a ground to open up about their issues. Psychoeducation must be entailed in the treatment program by mental health professionals where they address sexuality and related concerns with the patients along with psychoeducation for schizophrenia.104
Psychoeducation about the illness to the patient and the spouse helps them better understand symptomatology and course of illness, and also find the apt way of developing (or re-developing) the relationship. Sexuality concerns must also be addressed with spouses in order to bridge relationship crises that arise with sexual difficulties and/or sexual dysfunction. The mental health professional may have to address various concerns regarding medication, how sexual dysfunction may be part of the illness, healthy sexual practices, components of sex education may be also be discussed and psychoeducation may also impart ways of developing/re-establishing sexual relationships for the couple. Psychoeducation enhances psychotherapeutic outcomes as well, which overall improves treatment outcomes and prognostic capacity.

Specific Issues in Female Adolescents With Schizophrenia

Epidemiological data tells us that adolescent onset of schizophrenia is a common phenomenon with a prevalence of 30% in youth below 18 years of age. There is a paucity of studies for this age group and the differences discussed are not representative of the adolescent population. However, it is important to bring to the fore, the existing possible sex differences that have been documented by researchers. Sex differences in adolescents with schizophrenia are noted in clinical characteristics of the illness as well as treatment outcomes. These differences accounted for by factors such as hormonal levels and structural and functional maturation of certain brain areas involved in functions such as information processing.

Research has found main differences with regard to higher adherence to treatment in males and sex differences in the pattern of cognitive recovery. In contradiction to adult males, younger males had a higher index of the depression/anxiety component. Some studies have shown female subjects with a better performance in social cognition and attention/vigilance domains. There is no data on sexual functioning, sexual promiscuity, puberty attainment, and sexual exposure in adolescents suffering from schizophrenia and hence has not been mentioned here.

PCOD, Sexuality, and Schizophrenia

Polycystic ovary syndrome, better known as PCOS, affecting 5% to 10% of women of reproductive age, is one of the most common endocrine disorders among women. PCOS is a complex illness, characterized by irregular menses, excessive amounts of androgenic hormones and polycystic ovaries. With its recent link to increased risk for cardiovascular diseases and type 2 diabetes, PCOS is not only a reproductive problem but as a severe metabolic disease as well that poses crucial health risks in progressive age. There has also been increasing interest and association between PCOS and mental health as well as the status of having a psychiatric illness. According to past studies, about 57% of women with PCOS also account for having at least one psychiatric disorder as well.

In addition, previous research has focused on the link between PCOS and psychiatric comorbidities, the association between PCOS and new-onset psychiatric disorders remains unexplained. PCOS has been found to be a possible risk factor for developing subsequent psychiatric disorders.

There is no conclusive evidence to show a difference between the prevalence of schizophrenia among patient with PCOS versus patients without PCOS. There is available data to explain sexual functioning and sexual dysfunction in patients with PCOD and schizophrenia.

Sexual Abuse and Misuse of Female Patients With Schizophrenia

Vulnerable population have always been at a greater risk for exploitation, women with schizophrenia are understood to be at a yet further risk. A grave societal problem, though both sexes are at risk, the risk for victimization is much higher in women. Suffering from schizophrenia renders women to further disability and as is well known, the risk for vulnerability is positively correlated with disability status. Disabled persons are known to experience significantly more violence in forms of physical, sexual, and intimate partner violence as well as stalking/harassment, than those without disability. Women with psychological disabilities are targeted more than others by both intimate partners and non-domicile perpetrators. Data reveals that women with severe mental illnesses like schizophrenia have a 6 to 9 folds higher risk of sexual abuse. Some research findings suggest 36% of young (child and adolescent) women with schizophrenia have been victims of sexual abuse. In women with schizophrenia, this sexual abuse was associated with addictions, suicide attempts, and becoming psychiatric patients earlier. Over their lifetime, the prevalence of rape was found to be 23%, which has been associated with a greater severity of their disorder and addictions. There has also been frequent repetition of sexual trauma in women with schizophrenia. There have been instances even in institutional settings and in rural areas that women with schizophrenia in a disorganized state may be an easy target for abuse and exploitation (Personal Clinical Experience). We know that sexual abuse of any form may have effects on future sexual functioning of the individual and that sexual abuse is a risk factor for sexual dysfunction, but this has not been studied with regard to sexual abuse or misuse in female patients with schizophrenia.

Menopause and Schizophrenia

The mechanism for menopausal transition and onset schizophrenia in women is uncertain though is roughly around
the 40s. Hypoestrogenism has been found to have an association with psychotic symptoms, though only in a smaller subset of women. Mental health crisis during the menopausal transition, is seen in disorders such as bipolar disorder with psychosis and schizophrenia. A case series of 5 women with bipolar affective disorder and postpartum psychosis demonstrated worsening of symptoms during perimenopause. In these individuals, most presented with psychosis in the setting of an acute manic episode. Sleep deprivation is another major stressor during the menopausal transition, which exacerbates the presentation of many mental illnesses.

Some theories propose that estrogen may have a protective effect, as evidenced by the increase in symptom severity in some women with schizophrenia at the time of menopause. Women who have a typical onset of schizophrenia tend to have a mild course of the illness as compared to their male counterparts; however, it worsens as women start to near menopause. Some animal models and clinical reports suggest that estrogen has an antidopaminergic effect that generally worsens as women start to near menopause. Some animal models and clinical reports suggest that estrogen has an antidopaminergic effect that generally leads to the surfacing of psychotic symptoms as a result of the low estrogen levels.

Estrogen was found to decrease psychotic symptoms in younger premenopausal women with schizophrenia in a meta-analysis that has been published. Further, a study of combination progesterin and estrogen therapy showed no effect on perimenopausal women with schizophrenia and their relapse rates. This may show that additive progesterin possibly negates the beneficial effects of estrogen for mental health.

Raloxifene is a selective estrogen receptor modulator and has shown to improve memory and executive functioning in women with schizophrenia during menopause, though in a smaller sample (n = 33). Improvement in positive symptoms of schizophrenia was also reported in another study that looked at results of 46 menopausal women with schizophrenia, who were administered raloxifene along with risperidone. The benefit of raloxifene over estrogen alone is that raloxifene has estrogenic effects in the brain.

It is important to consider schizophrenia on the differential diagnosis for women in their 40s and 50s who are likely to present with altered mental status or abnormal thought process as a result of several other sociodemographic and psychological reasons. There may be a protective benefit of hormone therapy during the menopausal transition but research shows that estrogen, and possibly selective estrogen receptor modulators can be better used adjunctively in chronic schizophrenia. There is no documentation to understand the levels of female sexual hormones, sexual functioning, and sexual dysfunction in menopausal women that suffer from schizophrenia in comparison to healthy controls.

## Conclusion

FSD remains a neglected component in the management of schizophrenia. There is a need for clinicians and psychiatrists to explore this area when treating patients with schizophrenia and manage various aspects of this problem. Questioning about the same must become an integral part of the routine clinical interview in patients with schizophrenia. This review exhorts the need for future research in this area in large cohorts and the need for proper clinical guidelines in the management of the physical and psychosocial aspects of FSD in schizophrenia.

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