Female Sexual Arousal Disorders

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ABSTRACT

Introduction. Definitions and terminology for female sexual arousal disorder (FSAD) are currently being debated. While some authors have suggested that FSAD is more a subjective response rather than a genital response, others have suggested that desire and arousal disorders should be combined in one entity. Persistent genital arousal disorder (PGAD) is a new entity which is suggested to be defined as Restless Genital Syndrome.

Aims. The aims of this brief review are to give definitions of the different types of FSAD, describe their aetiology, prevalence and comorbidity with somatic and psychological disorders, as well as to discuss different medical and psychological assessment and treatment modalities.

Methods. The experts of the International Society for Sexual Medicine's Standard Committee convened to provide a survey using relevant databases, journal articles, and own clinical experience.

Results. Female Arousal Disorders have been defined in several ways with focus on the genital or subjective response or a combination of both. The prevalence varies and increases with increasing age, especially at the time of menopause, while distress decreases with age. Arousal disorders are often comorbid with other sexual problems and are of biopsychosocial etiology. In the assessment, a thorough sexological history as well as medical and gynecological history and examination are recommended. Treatment should be based on of the symptoms, clinical findings and, if possibly, on underlying etiology.

Conclusion. Recommendations are given for assessment and treatment of FSAD and PGAD. **Giraldi A, Rellini AH, Pfaus J, and Laan E. Female sexual arousal disorders. J Sex Med 2013;10:58–73.**

Key Words. Female Sexual Arousal Disorder; Persistent Genital Arousal Disorder; Definitions; Assessment; Treatment

Definition

Definitions of sexual arousal have in the past focused solely on the physiological aspect of arousal, i.e., genital vasocongestion, lubrication, tingling as well erection of the nipples and flushing of the skin as based on the largely phenomenological and objective descriptions by Dickinson [1], Kinsey et al. [2], and Masters and Johnson [3].

Based on this concept Female Sexual Arousal Disorder (FSAD), in the current edition of Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR), is defined as the "Persistent or recurrent inability to attain, or to maintain until completion of the sexual activity an adequate lubrication-swelling response to sexual excitement. The disturbance causes marked distress or interpersonal difficulty. The sexual dysfunction is not better accounted for by another AXIS I disorder (except another sexual dysfunction) and is not due to the direct physiological effects of substance abuse or a general medical condition" [4].

This exclusive focus on genital response in the DSM-IV-TR diagnosis has been criticized, because it overlooks the subjective component of sexual arousal: the experience of sexual excitement and pleasure. In the clinical setting, women often complain of vaginal dryness or discomfort and pain with intercourse, while lack of sexual arousal is more likely referred to as low or absent subjective

experiences of excitement [5]. There is evidence that, especially for women, genital sexual arousal responses do not always clearly coincide with subjective experiences [6,7]. Instead, women's subjective experiences of sexual arousal appear to be based more on their appraisal of the situation [7]. Moreover, in somatically healthy women diagnosed with FSAD according to DSM-IV-TR criteria, genital responses are rarely compromised [8]. However, it is plausible that for some women physiological impairments in sexual arousal are causing distress. For example, there is substantial evidence that many postmenopausal women with FSAD report symptoms from urogenital atrophy including vaginal dryness [9].

Another limitation of the definition of FSAD is the variance in the meaning of adequate arousal across women. For some, adequate arousal involves physical as well as "psychological" and situational sexual arousal [10]. Moreover, there is great variety in the ease with which women can become sexually aroused and the types and intensity of stimulation needed [11].

In an attempt to reconcile the discrepancy between the DSM-IV-TR definition of arousal and the described empirical evidence collected by psychophysiological studies, an international committee was convened by the American Urological Association in 2002 [12]. The committee proposed to divide FSAD into three subtypes:

Genital Sexual Arousal Disorder

"Complaints of absent or impaired genital sexual arousal. Self-report may include minimal vulval swelling or vaginal lubrication from any type of sexual stimulation and reduced sexual sensations from caressing genitalia. Subjective sexual excitement still occurs from non-genital sexual stimuli."

Subjective Arousal Disorder

"Absence of or markedly diminished feelings of sexual arousal (sexual excitement and sexual pleasure) from any type of sexual stimulation. Vaginal lubrication or other signs of physical response still occur."

Combined Genital and Subjective Arousal Disorder

"Absence of or markedly diminished feelings of sexual arousal (sexual excitement and sexual pleasure) from any type of sexual stimulation as well as complaints of absent or impaired genital sexual arousal (vulval swelling, lubrication)."

Although these proposed revisions are an improvement because they better capture the experiences of some women, they are not part of any accepted nomenclature and only a paucity of research has addressed the validity and clinical usefulness of such subdivision. We believe that collecting information on the type of sexual arousal problem experienced by the women is useful. However, at the present time, it remains unclear how this subdivision of FSAD could lead to a different diagnosis or treatment. One of the main limitations of research trying to establish the clinical utility of this subdivision is that women are not very accurate in their reports of physiological sexual arousal and most of the assessments are based on self-reports [13]. Moreover, only two studies [14,15] have investigated a distinction between the described subtypes of FSAD and the results from these studies do not completely match the expected outcomes and need to be replicated before we can state that Genital FSAD can be distinguished from Subjective FSAD.

Recently, in the proposal for revision of the DSM-5, recommendations have been made to combine women's sexual desire and arousal disorders into one entity [16]. It is not the goal of this article to review the proposal and the criticism that has been published on this topic, but it is important to acknowledge that scholars are still unclear on whether women can distinguish between sexual desire and subjective states of sexual arousal and how arousal definitions shall be in the future [16–18].

Overall, FSAD can be divided into primary arousal problems, meaning that the woman has never experienced sufficient arousal despite sufficient desire and sexual stimulation, and secondary arousal disorder, in which the woman experiences decreased arousal but has previously been able to become aroused. The disorder can be generalized (it appears in all sexual situations) or situational (it only appears in some situations). Very often FSAD coexist with other sexual dysfunctions [19,20].

Conclusions and Recommendations

- The current definition of FSAD is focusing on loss of genital arousal (lubrication, congestion, swelling, sensation), which may be an inaccurate or limited definition of the type of difficulties experienced by women who have problems becoming sexually aroused (level A).
- The focus on "lubrication/swelling response" in the DSM-IV-TR definition of FSAD is not representative of many women's perception of sexual arousal (level A).

- Laboratory studies have shown that many women vary in the concordance between subjective and genital sexual arousal and while for some women this concordance is strong, for many it is weak, and most importantly, this concordance does not appear to be weaker for women diagnosed with FSAD (level A).
- New definitions of FSAD have been suggested for the future DSM-5 definitions based on the current evidence. As it is unclear whether they will be part of the final DSM-5 document it is impossible to provide recommendations at the present.

Prevalence and Risk Factors

The prevalence of FSAD in most epidemiological studies is based on the conventional definitions of arousal, often addressed as "problems with lubrication (vaginal dryness)" and "problems with arousal." Notably, most epidemiological studies omitted questions of distress caused by the problems with arousal and therefore are only accurate reflection of problems with sexual arousal and not of clinically defined FSAD.

The range of prevalence of sexual arousal is 6% to 28% of women, with the majority of studies reporting between 13% and 24% [16,21–27]. In postmenopausal women up to 55% report vaginal dryness symptoms [9]. Several studies have demonstrated that the prevalence of arousal problems is increased with increasing age, peaking after the age of 50 years [28]. In a large U.S. study the overall prevalence of arousal problems was 27%. When adjusted for distress the prevalence of arousal disorder was reduced to between 3.3% (age group 18–44 years) and 7.5% (45–64 years). Consequently, the prevalence of FSAD is almost constant between age groups as women report more arousal problems with increased age, but are less distressed by the condition [28,29].

The duration of the arousal problems varies and there is no agreement on duration for the arousal problem before it should be considered a disorder. A review of epidemiological studies reports that for 10% of women sexual arousal problems last 1 month, for 60% of women they last between 1 and 6 months, and for 30% they last more than 6 months [20].

Existing data indicate that a transcultural difference exists in the prevalence of arousal problems. Epidemiological studies report that among early perimenopausal American women, ethnicity was strongly associated with the self-reported level of arousal with African-American and Hispanic women reporting lower levels of arousal than Caucasian women [30]. Young women of East Asian descent reported more often problems with genital arousal than women with European background in a study of Canadian women [132]. Cross-cultural studies on women aged 40–80 years indicate that women from the Middle East and East and Southeast Asia reported lubrication problems significantly more often (23–38%) compared with women from Europe and North America (16–27%) [31]. These findings suggest that health providers need to take into consideration that women from some ethnic backgrounds may be more susceptible to sexual problems; they may be more likely to report sexual arousal problems, and when reporting sexual arousal difficulties they may be more likely to report some symptoms (e.g., physical symptoms such as lack of lubrication, as compared with others, e.g., lack of feeling sexually aroused).

Biological Risk Factors

The automatic sexual responses to sexual stimulation that lead to genital congestion and vaginal lubrication rely on the autonomic nervous system and intact nerve-mediation and vascular function as well as on the hormonal milieu [32]. Estrogens enhance blood flow to the genitals and to thicken and moisten the vaginal epithelium. Therefore, disruptions in any of these parameters may result in impaired genital arousal response and FSAD (Table 1). Vul-

Table 1 Risk factors for FSAD (for references see text)

Biological
Hormonal factors
• Decrease of estrogens
• Decrease of androgens
• Diabetes
Neurological
Infections
• Vaginal
• Urinary tract
Iatrogenic
• Surgery
• Radiation
• Medication
Psychological, intra-and interpersonal
• Depression and anxiety
• Negative cognitive styles
• Personality
• Distraction and self-focused attention
• Perceived stress
• Body image
• Relationship problems
• Partners sexual dysfunction
• Sexual abuses
• Physical and emotional abuse
• Cultural factors

vovaginal atrophy is caused by decreased estrogen levels in postmenopausal women, including vaginal dryness among many symptoms. Several epidemiological studies have estimated that up to 57% of postmenopausal women experience symptoms of vaginal atrophy with vaginal dryness [9,33–36]. Although the changes in hormonal milieu occurring during menopause are important for the sexual arousal response, studies on the relationship between FSAD and decline in estrogens have been inconclusive. In some studies the decline in estrogens was associated with FSAD [35] while other studies have shown no such relationship or have found other factors to be related to FSAD such as prior sexual function, partner status, and attitudes to menopause [35,37–41]. Data suggest that in postmenopausal women the arousal response is more correlated to the level of estrogens than in women in the menopausal transition [40].

Furthermore, it can be difficult to separate the effect of age and menopause, and one study has shown that they both, independently, affect sexual responsivity [27,42,43].

Androgen levels decline with age in adult women. Levels decline steeply from age 18 to 34 and with a more gradual decline until the mid 60s [42]. Natural menopause does not affect androgen levels, whereas surgical menopause is associated with lower levels of total and free testosterone [42]. Though the arousal response is thought mainly to be mediated by estrogens, testosterone may also have an effect by enhancing vaginal blood flow and lubrication. The effect may be due to a direct effect or conversion of testosterone to estradiol [37,42]. Recently, the level of the steroid precursor Dehydroepiandrosterone (DHEA) has been proposed as crucial for development of postmenopausal vaginal atrophy, as DHEA is found to have a protective effect [44,45].

Various medical diseases involving the autonomic nervous and vascular system are known risk factors for FSAD. These include diabetes, which may affect sexual arousal function directly through impairments in the vascular system or through neuropathy [46]; neurological disorders such as multiple sclerosis and spinal cord injuries. Other medical conditions may also indirectly affect sexual arousal if the treatment of these conditions include surgeries on the pelvis and genitals, which may cause nerve damage, radiation therapy [133] on genital and pelvic structures, which may damage tissue structures, vessels, and autonomic nerves. Recurrent urinary tract infections also affect the arousal response as well as recurrent vaginal infections, which creates irritative symptoms, and decreased lubrication [28,47,48]. Antiestrogenic treatment for hormone sensitive breast cancer is a substantial risk factor, both the antiandrogens that block the action of estrogens, as well as the aromatase inhibitors that inhibit estrogen-synthesizing enzymes [49].

Psychological, Intra- and Interpersonal Risk Factors

Cognitions and Affect

It is well known that cognitive-affective mechanisms can affect people's responses to stimuli, including sexual stimuli [50]. For example, studies have shown that negative views about the sexual self (negative sexual attitudes) or negative expectations about sexual encounters are associated with less subjective sexual arousal during exposure to sexual stimuli in the laboratory [51]. Interestingly, the negative schemas were associated with the subjective but not the physiological arousal sexual responses, corroborating the hypothesis that physiological sexual arousal is, at least in part, an automatic response that receives only minor input from psychological processes [5].

It is possible that, in people with negative cognitive styles, low (or lack of) subjective sexual arousal may be the product of a more pervasive negative affectivity that permeates different spheres of the person's life. Indeed, in studies that induced affect during a laboratory test of physiological sexual arousal, participants reported lower subjective sexual arousal after a negative mood induction than after a positive mood induction [52].

Depression

Several epidemiological studies have shown that depression is associated with arousal problems in women, often coexisting with desire problems [28,53,54]. This has been supported by the abovementioned studies [52]. Taken together this evidence suggests that negative affectivity may have pervasive effects on the sexual response of women and therefore addressing mood during the assessment and treatment of sexual arousal disorder is useful. However, the relationship between affect and sexual arousal is far from being understood and some studies have shown that activating both negative and positive mood increased subjective arousal compared with the response to either negative or positive mood [55].

Anxiety

Research examining the role of anxiety in sexual dysfunction has included both clinical studies

and controlled laboratory investigations. Early psychodynamic theories placed a heavy emphasis on anxiety as an important etiological predictor of sexual dysfunction [56]. Many studies found higher levels of anxiety in women with sexual problems (for review see [16]), and women with anxiety disorders are found to have higher rates of sexual dysfunction, including arousal disorders [57,58]. Interestingly, it has been shown in well-controlled laboratory studies that anxiety-inducing techniques significantly increase genital sexual arousal in a nonclinical population [59].

Personality Variables

Personality features of low/fragile self-regulation and self-esteem, as well as histrionic personality, relate to impaired sexual response. Women with histrionic personality disorder were compared with non-histrionic women and were found to be significantly less sexually assertive, to have greater erotophobic attitudes toward sex, lower self-esteem, and greater marital dissatisfaction [60].

Sexual Abuse

Experiences of sexual abuse are associated with lower physiological sexual arousal responses and greater rates of FSAD [61]. The exact mechanisms for the impairments in the sexual arousal responses of sexual abuse survivors are yet to be understood; however, it appears that biological factors, such as the Hypothalamic–Pituitary–Adrenal (HPA) axis, and psychological factors, such as views about the sexual self (sexual self schemas) and posttraumatic stress disorder, may be involved [61]. It is equally important to note that not all women who experience sexual abuse develop sexual dysfunction and that not all the sexual dysfunction of women with a history of sexual abuse can be traced back to the abuse. Indeed, a recent study has shown that the predisposition to avoid experiences is a moderator of sexual problems during adulthood, meaning that, among those women who are abused, those who develop sexual dysfunctions also show the tendency to avoid experiences which may prevent them to have positive, corrective experiences [62]. Additionally, the HPA axis closely interacts with the sympathetic nervous system in a way that could be adverse to sexual arousal. Cortisol has a potentiating effect on the adrenergic contraction of smooth muscles [134]. Relevant to physiological sexual arousal, cortisol could increase adrenergic contraction smooth muscle cells in the vaginal capillary system resulting in reduced blood flow. Indeed, in sexually healthy women, physiological sexual arousal is associated with a slight decrease in cortisol levels [135]. In addition to sexual abuse, evidence suggests that other types of childhood abuse, such as physical and emotional abuse, may also have negative consequences on sexual arousal [63,64]. Theoretically, given the important relational component of sexuality, it is feasible that the disruption caused by childhood abuse on the ability of the individual to form meaningful relationships may indeed impact the development of trust and may promote fear during intimate situations, which can inhibit sexual arousal.

Individuals with major depressive disorder or posttraumatic stress disorder in response to a history of abuse should be treated for these conditions first or concurrent with the sexual arousal disorder.

Relationship Quality

Sexuality, in addition to being affected by psychological factors relevant to the individual, is also heavily dependent on the psychological well-being of the couple and the functioning of the partner. Specifically, relationships can play a role in sexual arousal functioning if the woman is unable to communicate her preferred types and intensity of stimulations to her partner [65]. However, it is also important to note that a review of epidemiological studies reported that sexual arousal disorder is less affected by relationship problems compared with hypoactive sexual desire disorder [66]; thus relationship issues should be considered but healthcare providers should not assume that a relationship difficulty automatically leads to problems with becoming sexually aroused.

Distraction and Self-Focused Attention

Theoretically, distractions that lead a woman to focus attention to nonsexual thoughts or that bring her to evaluate herself during sexual activities (spectatoring; [67]) inhibit sexual arousal. Self-focused attention may negatively impact genital and subjective sexual arousal to sexual stimulation [68]. A recent study found that taking a participant and emotion-oriented focus rather than a spectator and stimulus-oriented focus while viewing erotic stimuli enhanced the feelings of sexual arousal [69]. In general, distraction has been shown to be detrimental to female sexual arousal, especially subjective arousal [70–72].

Perceived Stress

Some observational studies have shown that psychosocial stress in general may reduce the motivation to become sexually active. Apart from

cognitive processes there may be an incremental effect of a stress induced cortisol secretion [28,73]. There is one experimental study on the effect of (acute and chronic) psychological stressors on genital and subjective sexual arousal [74]. Acute stress resulted in a reduction of genital and subjective sexual arousal to an erotic stimulus in sexually functional women. In addition, women with high levels of chronic stress responded with lower levels of genital but not subjective sexual arousal to an erotic stimulus than women with low levels of chronic stress.

Body Image

Body image self-consciousness has negative effects on female sexual function, above and beyond actual body size or general body image dissatisfaction [75,76].

Partner's Sexual Dysfunction

A considerable number of studies have shown that sexual dysfunction of the male partner, especially erectile dysfunction and premature ejaculation, have a negative impact on the female partner's sexuality including FSAD [77]. Several studies have shown that successfully addressing the erectile dysfunction restores the woman's sexual quality of life [78,79]. However, there are also qualitative data showing women's dissatisfaction with not being involved in treatment decision making when their male partner's sought treatment for erectile difficulties, and that they would have welcomed a couple approach that equally emphasized her own sexuality and pleasure [80]. A medically induced erection has also been found to lead to resistance in some women as it is perceived that the erection is unrelated to her partners desire for her [81].

Conclusions and Recommendations

- FSAD often show comorbidity with other sexual problems (level A).
- The prevalence of arousal problems varies from 6 to 55% in women (level A).
- If distress is included as a parameter the prevalence is significantly decreased (level A).
- Arousal problems increase with increasing age, while distress decreases (level A).
- Decline in estrogens leads to increased prevalence of vaginal atrophy including vaginal dryness (level A).
- In some studies the decline in estrogens was associated with FSAD while other studies have shown no such relationship or have found other factors to be related to FSAD such as prior sexual function, partner status and attitudes to menopause (level A).
- Cultural factors affect the prevalence of FSAD (level A).
- Depression and anxiety are risk factors for FSAD (level A).
- Sexual abuse is a risk factor for FSAD (level A).
- Partner's sexual dysfunction is a risk factor for FSAD (level A).
- Relationship problems are risk factors for FSAD (level A).

Assessment

Arousal and arousal problems are best assessed using a biopsychosocial approach exploring predisposing, precipitating, and maintaining factors with the woman. The healthcare provider can ideally go through all factors as described, but it depends on his/her expertise, time, and experience and needs to be adjusted to the clinical situation. A full assessment includes a thorough medical and sexological history and a medical examination. Finally, the degree of distress should be evaluated. In Box 1 are *suggestions* for a clinical assessment that may be helpful. For assessment of sexual problems also see ref 137 (Bitzer J, Giraldi A, and Pfaus J. A standardized diagnostic interview for Hypoactive Sexual Desire Disorder in women: standard operating procedure [SOP part 2]).

Sexological History

A detailed history of the nature of the arousal problems and the conditions under which the problems occur is required. If possible, it is recommended that the partner is included in the evaluation. The partner's presence may not only be important for obtaining a complete picture of the complaints and the context in which the couple has sex, but also enables fears and concerns the woman has regarding the impact of her problems on her partner to be addressed directly.

- Is she mentally sexual excited, e.g., from:
  reading, viewing, hearing erotica
  stimulating the partner
  receiving sexually stimulation to nongenital and genital areas
  deliberate sexual fantasy or recall of sexual memories
- Is she aware of a genital response during sexual stimulation (tingling, pulsing, throbbing, vaginal lubrication)?
- Is there vagina dryness and/or dyspareunia? Pain or fear of pain may act as a powerful

Box 1. Text: Questions of importance when evaluating women with FSAD

1. Can you describe your problem in your own words?
   — When she describes the problems ask clarifying question in order to find out whether it is the primary problem or secondary to other sexual disorders. Arousal disorders are very often secondary to desire disorders.
2. Has the problem always been there?
   — If yes, check psychosexual and relational factors first and awareness/lack of awareness of signs of genital arousal
   — If not, ask when it appeared and what—in the patient's opinion—might have triggered the problem. Did it come slowly or suddenly?
3. Are you sexually active? With or without a partner?
   — If she is regularly sexually active, is she pleased with the activity? Are there differences in her response?
   — Does she enjoy intercourse?
   — Is there sufficient sexual stimulation
   — Does she masturbate? If yes, is the problem also present when she masturbates?
4. Is the problem limited to your partner/and or to a special context/situation?
   — If yes, check relational and contextual factors
   — If no, and the problem is generalized, check personal psychosexual factors and biological factors
5. Does your partner have a sexual problem?
   — e.g erectile dysfunction, desire problem, orgasm problem or rapid or delayed ejaculation? Be aware that she can be the "carrier" of the partner's sexual dysfunction.
6. What does the problem mean to you?
   — To estimate the degree of distress. Does it lead to frustration, guilt, shame or other feelings?
7. What does the problem mean to your partner and tho the relationship?

distractor and may thus impede sexual arousal. Conversely, vaginal dryness and superficial or deep pain during penetration may be symptoms of insufficient sexual arousal.

- Does the woman receive adequate sexual stimulation? What is adequate arousal may vary across women, therefore, detailed probing is necessary of (variety in) sexual activities (masturbation methods and experiences, sexual stimulation provided by the partner, use of additional imaginary [fantasy], tactile [e.g., vibratory], and visual stimulation), and the conditions in which sexual activity takes place.
- Is there comorbidity with other sexual disorders? Is there a desire problem, a pain problem or an orgasm problem?
  What came first? Is the arousal problem secondary to other sexual problems or the primary problem?
- Is she distressed by the condition? Is the condition causing distress to the relationship?

Psychological and Relational History

- Cognitive and affective evaluation
  Clarify her thoughts before, during, and after the sexual experience: is she feeling distracted, disregarded tired, sexually substandard, worried that the outcome would be negative, unsafe situation (pregnancy, sexually transmitted infections), unhappy about their sexual intimacy/practices?
  Clarify her emotions: is there sadness, embarrassment, guilt, awkwardness, displeasure before, during, or in response to the sexual encounter?
  Assess for depression. If a history of trauma (sexual or not) is present, assess for posttraumatic stress disorder. Assess for anxiety disorders including phobias, generalized anxiety, panic disorder, and social anxiety.
- Relational evaluation
  Does the partner have a sexual dysfunction?
- Is she attracted to her partner? Are there relational problems? Are there conflicts, aggressiveness, abuse, or limited privacy? [82–84].
- Did she experience any unwanted sexual experience while growing up or as an adult?
- Did she experience physical or emotional abuse while growing up? If yes, has this affected how she sees herself sexually (i.e., passionate, romantic, open to sexuality, abuse to be assertive about her sexual needs, embarrassed, conservative in her sexual preferences)? Is she experiencing fear or anxiety in anticipation to or as a result of

exposure to sexual stimuli? Has she been able to have positive corrective sexual experiences after the abuse ended?
- How did her past experiences affect the way she sees herself (i.e., passionate, romantic, open to sexuality, abuse to be assertive about her sexual needs, embarrassed, conservative in her sexual preferences)?

Medical and Gynecological History

- Menstrual cycle, menopause (natural or surgical), pregnancy/breast feeding:
  Is it related to menstrual irregularities, breastfeeding, the menopause, or oral contraceptives?
  Gynecological and obstetric history.
- Somatic problems. Does she have diseases known to predispose to lubrication problems?
  Diabetes, recurrent lower urinary tract infections, recurrent vaginal infections, neurological diseases (multiple sclerosis, neuropathies, Sjögren's syndrome).
- Iatrogenic causes
  Surgical procedures in the genital area, the pelvis or lower abdomen with damage of the genitalia as well as vasculature or nerves, e.g., hysterectomy, pelvic cancer, episiotomy, raphy with retracted/painful scarring.
  Radiation therapy of the pelvic/genital area.
- Medication that may affect lubrication and/or desire

Physical Examination

A general physical exam is recommended when relevant and can be guided by the medical history. A gynecological examination is always recommended for reasons of good medical care and for education and reassurance. The examination is also a setting to explore perceptions, beliefs, and attitudes about a woman's own anatomy and encourage a patient's positive approach to her genitals and body. With respect to the women's capacity to become sexually aroused the information will be limited, as the examination is done when the woman is in a non-aroused state, but vaginal dystrophy suggesting estrogen deficiency or rarer conditions can be identified, as described below. For women with subjective or combined arousal disorders, there most likely will be no abnormality. Nevertheless, a "normal" exam can be highly informative for the woman [82,85].

The gynecological examination should focus on:

Inspection: vulvar anatomy. Are there any changes/abnormalities?
- For example, signs of inflammation, poor outcome of pelvic or perineal surgery, signs of lichen sclerosus or lichen planus, as well as involution or conglutination of the clitoris.
- Skin color and quality. Is the skin thin and dry, or pink, supple, and elastic? Are there fissures, eczema, papules, pustules, vesicles, or ulcerations?
- Does the vaginal mucosa appear estrogenized and moistened or does it appear atrophic with inflammation, fissures, erosions, and ulcers?
- Does the speculum examination show signs of atrophy (e.g., petechiae or atrophy discharge)?

- Palpation:
  Signs of myogenic or referred pain, or associated urogenital and rectal pain. If the women experiences pain, the pain map should be identified as described in the pain SOP. Pain or anticipated pain is a strong reflex inhibitor of lubrication and therefore an important point to investigate.
  - Inspection of pelvic floor trophism, muscular tone, and strength. Does she demonstrate a vaginistic response upon touch, which may indicate a strong fear of pain?
  - Scarring
- Sampling:
  - Determination of pH, which gives indirect evidence of tissue estrogen level and related vaginal ecosystems.
  - Sampling and culture of discharge when infection is suspected.

Laboratory Tests

Laboratory tests may be directed by relevant symptoms or findings in the general medical assessment. If low desire is comorbid or suspected as the reason for low arousal (genital as well as subjective or combined), assessing testosterone status is recommended (including free testosterone and Sex Hormone Binding Globulin [SHBG]).

Plasma levels of estrogens can give information on the endocrine component of arousal disorder and the menopausal status. However, plasma levels are not sufficient indicators of the experienced degree of vaginal dryness [86]. Prolactin levels should be checked if there is comorbidity with marked oligomenorrhea or amenorrhea, and/or if bilateral breast milky discharge is present (not related to lactation). If the clinical history or objec-

tive findings suggest hypothyroidism, thyroid-stimulating hormone (TSH) should be evaluated.

Conclusions and Recommendations

Evaluation of FSAD shall be directed toward biological, relationship, psychological, and social factors (level A).

Evaluation of FSAD should include a physical and gynecological examination when indicated based on the clinical history (level A).

Principles of Treatment of Sexual Arousal Disorder

If possible, treatment should focus on the most likely causal factor, taking into consideration the interplay between biological, psychological, and relational factors. In the clinical situation, arousal disorder is often combined with desire and/or orgasmic disorders and a more integrative treatment will then focus on the other disorders that may have led to arousal disorder (see SOPs on desire, orgasm, and pain disorders). In general very little evidence exists on especially non-pharmacological treatment modalities and even the pharmacological treatment possibilities are not very well investigated.

Women with **subjective arousal problems** may benefit from a treatment focusing on awareness of genital responses and becoming subjectively aroused. The techniques that can be used are cognitive-behavioral techniques and/or traditional sex therapy with sensate focus or psychodynamic treatment and as a newly introduced, mindfulness.

Women with **genital arousal** disorder may benefit from pharmacological treatment enhancing lubrication as well as focus on adequate sexual stimulation.

Psychosexual Treatment of FSAD

Only a few studies have evaluated the effect of non-pharmacological treatment on FSAD.

FSAD can be treated with traditional sex therapy including sensate focusing exercises with the emphasis on becoming more self-focused and assertive [87]. A lack of meaningful treatment goals for women, the difficulty in obtaining adequate control groups, and the lack of clear treatment protocols, may explain the paucity of well-controlled randomized trials of psychological therapy. Nevertheless, clinical evidence suggests that the women often benefit from traditional sex therapy (level D evidence).

Mindfulness

Only two controlled study have investigated the effect of a mindfulness-based treatment on sexual problems compared with a cognitive–behavioral approach (CBT) [88,89]. These studies showed that women assigned to the mindfulness treatment reported significantly greater subjective sexual arousal and a stronger congruency between subjective and physiological sexual responses, compared with women assigned to a CBT as well as a significant decrease in sexual distress (level A). The first study using wait-list controls also found significant improvements in all domains of sexual response ([136], under review). Larger studies are needed before mindfulness can be considered an effective treatment for FSAD; however, the available evidence for this treatment is promising.

Pharmacological Treatment of FSAD

Pharmacological treatment of arousal disorder can be hormonal and nonhormonal.

Hormonal Treatment

Topical or Systemic Estrogen Therapy for FSAD. For women who are estrogen deficient, several studies have shown that topical or systemic estrogens may improve vaginal lubrication and decrease vaginal irritation and dryness [90].

A Cochrane review showed that local estrogen in women with vaginal atrophy had a positive effect on dryness and dyspareunia, no matter how the local estrogens were applied (creams, vaginal tablets, or vaginal ring) compared with placebo when given regularly and continuously [91] (level A).

Systemic treatment with estrogens is an alternative option and has been shown to decrease vaginal dryness, irritation, and pain compared with placebo in surgical and natural postmenopausal women, although a large inter-patient variability has been observed [92–94]. The Women's Health Initiative draw attention to long-term effects of systemic estrogen therapy and it is therefore important to individualize recommendations and treatment of women with arousal problems who may benefit from estrogen therapy [9,36] (level A).

Tibolone is a synthetic steroid with estrogen, progesterone, and some androgenic effect that lowers SHBG. In one large study it has been demonstrated to improve lubrication, but it is doubtful whether the effect on lubrication is better than estrogen substitution. However, as tibolone has a weak androgenic effect, it may be a choice for women with decreased desire and arousal problems, although larger scale studies still are needed [90,95–97] (level A).

Topical Vaginal DHEA. Topical DHEA has been shown to cause a reversal of symptoms and signs of vaginal atrophy with no or minimal changes in the level of serum steroids in postmenopausal women [98] and in one study to increase the arousal response in postmenopausal women [44] (level B).

Nonhormonal Treatment

Phosphodiesterase Type 5 Inhibitors (PDEs). The success of vasoactive agents in the treatment of male sexual arousal dysfunction has encouraged the search for vasoactive agents that enhance women's genital congestion and vaginal lubrication. PDEs have been investigated in several studies for treatment of FSAD. In a few studies in women identified with arousal disorder a beneficial effect was shown, while other studies have shown no effect compared with placebo. Women with hypoactive desire disorder showed limited efficacy, which can be explained by the absence of a centrally acting mechanism (level A).

Smaller studies in special populations of women with a medical condition have shown more consistent positive effects, for instance in women with multiple sclerosis, diabetes, and selective serotonin reuptake inhibitor (SSRI)-induced sexual dysfunction. As such, PDEs, may be beneficial in specific groups of women with genital arousal disorder [14,99–101]. Level B

Nonmedical Treatment

Vaginal lubricants applied intravaginally to relieve vaginal dryness during intercourse are often used in the clinical setting. There are water, oil and silicone based [9]. Oil based lubricants should not be used with latex products that are being used for birth control (such as the male condom). The latex will be destroyed by oil-based products. Care should be taken to distinguish between use of lubricants as a means of facilitating sexual stimulation, and use of lubricants to compensate for a lack of sexual arousal. We consider the former use as a genuine treatment of women's sexual arousal problem, whereas the latter merely enables unaroused vaginal intercourse but does not enhance sexual arousal and pleasure.

Vaginal Moistures. These may contain a bioadhesive polycarbophil-based polymer, that attaches to mucin and epithelial cells on the vaginal wall and have been shown to reduce symptoms of vaginal atrophy to the same degree as local estrogens in postmenopausal women [102,103] as well as a positive effect on the maturity of the vaginal epithelium (level B).

The EROS-CTD device (Clitoral Therapy Device; Urometrics Inc. USES, Anoka, MN, USA) is a small, battery-powered device designed to enhance clitoral engorgement, increase blood flow to the clitoris and vascular response. Only few, small noncontrolled studies exist on the effect and no data exist on the long-term effect [104–107] (level D).

Conclusions and Recommendation

Childhood sexual, physical, and emotional abuse should be considered when assessing FSAD; however, it should not be assumed that a history of abuse is necessarily the cause of FSAD symptoms (level A).

Posttraumatic stress disorder and major depressive disorders should be treated before or concurrently to sexual dysfunction in women with a history of childhood abuse (level B).

The tendency of experiencing negative affect and difficulties regulating and understanding emotions should be considered when treating FSAD (level B).

Mindfulness-based treatments are a promising approach to FSAD, although more controlled studies are needed to corroborate their efficacy and effectiveness (level A).

Estrogens, local and systemic, can increase vaginal lubrication (level A).

PDE5 inhibitors have been shown to increase vaginal blood flow and lubrication, but failed to have an overall beneficial effect on women's sexuality (level A). They may be beneficial in women with specific conditions as diabetes or spinal cord injury (level B).

Conclusion

Female Arousal Disorder has been defined in several ways with focus on the genital or subjective response or a combination of both. The prevalence varies and increases with increasing age, especially at the time of menopause, while distress decreases with age. Arousal disorders are often comorbid with other sexual problems and are of biopsychosocial etiology.

In the assessment, a thorough sexological history as well as medical and gynecological history and examination are recommended. Treatment should be based on of the symptoms, clinical findings and if possibly on underlying etiology. Lubricants, PDE5 inhibitors and hormone therapy (HT) may be of benefit if there is a genital arousal disorder. Women with subjective or combined arousal disorder may benefit from a treat-

ment focusing on awareness of genital responses and becoming subjectively aroused. The techniques that can be used are cognitive-behavioral techniques, traditional sex therapy with sensate focus or mindfulness.

Hyperarousal Disorders

In addition to the lack of sexual arousal in sexual circumstances that characterizes FSAD, women may also suffer from a persistent, unwanted, and distressing *increase* in genital blood flow in nonsexual circumstances. Persistent genital arousal disorder (PGAD), perhaps more appropriately called Restless Genital Syndrome (ReGS) [108], is a relatively new sexual health concern in women [108–131], having been proposed only a decade ago by Leiblum and Nathan [119]and subsequently as PGAD by Goldmeier and Leiblum [112]. ReGS/PGAD is characterized by five diagnostic criteria: (i) involuntary genital and clitoral arousal that persists for an extended period of time (hours, days, months); (ii) the physical genital arousal does not go away following one or more orgasms; (iii) the genital arousal is unrelated to subjective feelings of sexual desire; (iv) the persistent feelings of genital arousal feel intrusive and unwanted; and (v) there is distress associated with the persistence of the genital arousal [110]. Base rates of PGAD are not known as proper epidemiological studies have not been conducted. There are also as yet no diagnostic cutoffs regarding symptom severity. ReGS/PGAD is not recognized as a clinical disorder in either the International Classification of Diseases (ICD-10) or DSM-IV-TR, nor has it been proposed by the DSM Work Group on Sexual and Gender Identity Disorders for the new incarnation of the DSM-5 [115].

Little is known about the pathophysiology of ReGS/PGAD. There are no recognized animal models and there have been few reported clinical investigations of women with ReGS/PGAD [108,127–129]. ReGS/PGAD may be associated with psychological-related pathophysiologies, including depression and anxiety. Women with ReGS/PGAD report that stress worsens the genital symptoms, whereas distraction and relaxation strategies lower symptoms [113,114,120,122,124]. ReGS/PGAD may be associated with biological pathophysiologies including vascular, neurologic, pharmacologic, and hormonal etiologies. Waldinger and colleagues [108,128,129,131] have shown that the symptoms are comorbid with restless leg syndrome and overactive bladder syndrome, suggesting an overarching hyperesthesia and dysregulation of neurovegetative afferent and efferent signals, rather than a genital blood flow problem per se. Indeed, evidence of static mechanical hyperesthesia and neuropathy of the dorsal clitoral nerve have been reported [108]. Arterial vascular causes may be secondary to pelvic arteriovenous malformations with unregulated arterial communications to the genitalia. Venous vascular causes may be secondary to pelvic congestion syndrome with ovarian venous incompetence and large varices draining the genitalia [114,127]. Consistent with the notion of an overarching neuropathic syndrome, central neurologic causes may be secondary to Tourette's Syndrome, epilepsy, post-blunt central nervous system (CNS) trauma, post-neurosurgical intervention of central arteriovenous malformation, or to cervical and lumbosacral surgical interventions [113,114,122,130,131]. Peripheral neurologic causes may also be secondary to pudendal nerve entrapment or hypersensitivity [114,129]. Pharmacologic causes may be secondary to use of certain antidepressants, such as the serotonin receptor antagonist trazodone, or secondary to sudden withdrawal of SSRIs as occurs in sudden SSRI discontinuation syndrome [114,124,126]. Hormonal correlates may include initiation and discontinuation of hormone therapy in postmenopausal women, and excess use of herbal estrogens in over-the-counter agents [109,114]. Some cases of PGAD are idiopathic [113,114,120,122,124].

Potential Intervention Regimens

Unfortunately, there are as yet no published double-blind, placebo-controlled studies concerning therapeutic management of ReGS/PGAD symptoms and very little evidence exist on possible treatment of ReGS/PGAD. The literature is based almost entirely on case reports. Psychological interventions include management of depression, or focus on efforts to maximize relaxation through strategies such as distraction, and/or hypnosis [114]. Biological interventions include ice or topical anesthetic agents [130]. Discontinuing trazodone, venlafaxine, or excess herbal estrogen products may provide relief [109,125]. Women with ReGs/PGAD secondary to arterial-venous malformation may be cured by selective embolization, whereas women with ReGS/PGAD secondary to pelvic venous incompetence might benefit from embolization of the incompetent ovarian vein [127]. Positive outcomes have been reported following electroconvulsive therapy, but only in a

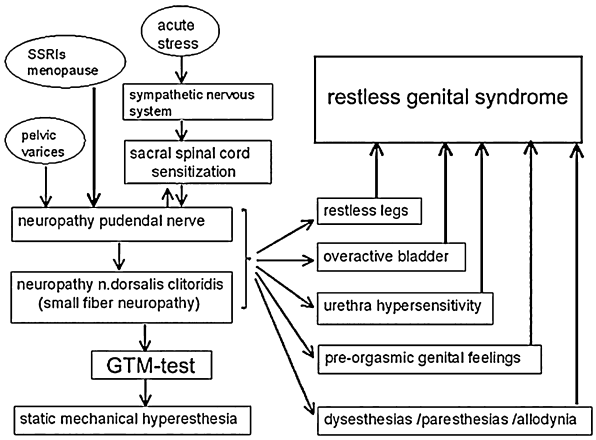

Figure 1 Potential pathogenesis of, Restless Genital Syndrome (ReGS)/Persistent Genital Arousal Disorder (PGAD) (from Waldinger et al. [108]). GTM test refers to a Genital Tactile Mapping test used by Waldinger to assess the sensitivity of the genital area. Static mechanical pressure is applied with a cotton swab to the area around the genitals, perineum, anal area, groins, and pubic bone while the woman lies supine. Stimulation of at least one area triggers an ReGS/PGAD episode in women who present with the symptoms.

few cases [118,131]. Surgical release of pudendal nerve entrapment has also resulted in symptom improvement. Pharmacologic strategies have included the use tricyclic or SSRI antidepressants (e.g., clomipramine, paroxetine), prolactin-elevating agents (e.g., olanzapine, risperidone), antiseizure medications (e.g., carbamazepine) [114,124,130], or the cholinergic inverse agonist varenicline tartrate used as an antismoking agent [117]. This latter finding suggests a potential central etiology involving hypothalamic control of sympathetic outflow (Figure 1).

Conclusions

Despite a growing body of case evidence, there is still a lack of basic information on prevalence, a lack of clinical trials for any treatment regimen, and a lack of consensus on whether ReGS/PGAD is a hyperarousal disorder per se, or a syndrome secondary to pelvic/pudendal/hypogastic sensory neuropathy. Thus, from an evidence-based standpoint, the diagnosis and treatment of ReGS/PGAD will continue to depend on the inspired intuitions of the clinician and patient, luck, and availability of treatment options (levels C and D).

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