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Sexual Dysfunction in Women: An Overview of Psychological/Psycho-social, Pathophysiological, Etiological Aspects and Treatment Strategies

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ABSTRACT

Sex response in women is expressed by different phases (desire, arousal, lubrication, plateau, orgasm and resolution). Any divergence would lead to female sexual dysfunction (FSD), which cause distress and agony. The psychological factors incorporate inhibitions from personality, depression, angedonia, anxiety and coital pain. Such inhibitions would isolate women to seek pleasures in unnatural means of satisfaction. While the medical problems such as frail or gigantomastia, insignificant or clitoromegaly, adhesions, vaginismus can be treated by commercially available medicines and surgery, most of the psychogenic treatment is based on cognitive behavioral and psychodynamic approaches, including psychotherapy and counseling. The pathophysiological aspects of FSD are illustrated by due emphasis on the organic causes related with dyspareunia, anorgasmia, urinogenital complications, different diseases, effect of drugs, hormonal imbalance, hysterectomy, menopause and age related FSD. The jeopardy in sexual function begins with the lack of libido, vaginal dryness, decrease of blood flow, which cause erectile dysfunction of clitoris and failure of vaginal engorgement and finally dissatisfaction in achieving orgasm and resolution. These symptoms have no limitations of age, however; they aggravate after menopause and/or in aged women. Commercially available gels and creams are used against vaginal dryness and androgens are used to increase libido. Although, there are a number of oral/topical pharmacologic strategies available to increase flow of blood, recently Sildenafil citrate (Viagra) has gained importance to increase vaginal engorgement and clitoral erection. While, both natural and synthetic antioxidants play a vital role in the treatment of organic disorder, a number of drugs such as dehydroeplandrosterone (DHEA), bupropion, arginine, kyogreen, phytoestrogens, dong qui, horny goat weed, Lobelia, damiana, Siberian ginseng and herbal formulation of Muira puama and Ginkgo biloba (Herbal vX) are popularly used by women to have a beneficial effect. The other measures of treatment include hormone replacement therapy and employment of battery operated vibratory devices to treat sexual arousal and orgasm disorders. We analyze that the FSD is a common problem among women, irrespective of age and suggest that the women health providers should periodically examine the sexual activity of their patients. There should be a thorough screening for FSD and expert consultation be provided for treatment and counseling.

KEY WORDS: Female sexual dysfunction, natural products, Psychological effects, Etiological aspects

INTRODUCTION

The sexual response in women is based on (i) desire (ii) arousal (iii) lubrication (iv) plateau (v) orgasm and (vi) resolution. The first three components are interdependent and are greatly responsible to achieve plateau, orgasm and resolution. Although, desire is an important factor for a successful achievement of sexual response, there can still be a good functioning even without a desire. This is perhaps due to the passive role of women and the man take charge of an orchestrate sex encounter. The phases of orgasm and resolution are deemed to be achieved in a sub-conscious state of mind. Hence, it is logical to understand that when the "point of no return" is reached, the woman gets orgasm and resolution, even in a forcible sex or rape. Sexual desire is considered to be the most preliminary factor that depends on a thought. A thought could be anticipation of a delighted evening ahead or a memory of a previous sexual encounter or some obscene visualization, which triggers neurological pathways for physical arousal. The arousal needs touches around the sensitive areas and then the response takes its own course through the remaining events, such as; lubrication, plateau, orgasm and resolution. A number of factors including, psychological and pathophysiological causes have been found to interfere with normal functioning at any of the events of sexual response and cause FSD.

The present study is an attempt to review literature on the different aspects of psychological and pathophysiological basis of FSD, including the etiological factors and treatment strategies. The review is split into (i) Psychological factors, their etiology and treatment strategies and (ii) Pathophysiological aspects, their etiology and treatment

strategies. The discussion on observations and causes is twined together, because of their interdependence on each other. The different aspects of psychological and psycho-social factors and their etiologies have been entwined as follows; inhibition, depression, sexual angedonia, genital pain, interpersonal relationship, age and menopause, surgical operations and treatment strategies. Likewise the different factors of pathophysiological factors and their etiologies are intervolved together as follows; dyspareunia, adhesions, vasculogenic, vaginismus, clitoral erection, anorgasmia, hormones, diseases, drugs and alcoholism, urological complications of coitus, hysterectomy, menopause, sexual activity in aged women and treatment strategies. A number of treatment strategies (used against both psychological/psycho-social or pathophysiological etiologies) mentioned in this review are natural products marketed as food supplements. Although these products are permitted to be sold as supplements by State Administrations, they are not approved by American Food and Drug Administration or the European Health Regulations. Hence, such products must be used strictly under medical supervision. These products are manufactured by different companies (Nature's way, Futurebiotics, Nature's finger print, Good'n Natural, Weider, Muscle Tech Research and Development, General Nutrition Corporation [GNC]) in the USA and marketed by GNC throughout the world.

Psychological and psycho-social aspects of FSD

Inhibition

Personality is considered an important factor which keeps one isolated to avoid possible negative responses. Inhibitions may be due to any disparity or any prominently visible physical disabilities. In addition there are some abnormalities which the women never like to share with anybody. These can be related with the vital stimulating organs such as breasts and/or clitoris. Breasts, accommodates the nipple-areolar complex which is the most sensitive part to stimulate sex. However; when they are very small or feebly developed, they become a matter of inhibition from any exposition. Some women have oversize breast (gigantomastia), which present an unpleasant appearance, causing resistance and/or inhibition (1). The other stimulating organ is a clitoris (vestigial penis in female). When the clitoris grows to abnormal proportions, it is called as clitoromegaly. This anomaly can also be an inhibition from any desire that warrant exposure (2). Obesity and/or abnormal personality are also a psychological inhibition in women, which promotes avoidance of sex. It is caused by higher estrogen and insulin levels and a greater concentration of growth factors in adipose tissue, in addition to hypertension, cholesterol metabolism abnormalities and immune malfunction. These inhibitions directly interfere with normal sexual function and keep the victims drifted to prefer either to masturbate or seek pleasure in same sex (3).

Depression

Depressive illness, including stress and fatigue interfere with sexual function in women. In a report on depressive symptomology, Frohlich and Meston, (4) found that the depressive symptoms diminished desire for sex causing inhibitions of arousal, lubrication, plateau, orgasm and satisfaction. Generally the women with depressive symptoms reported greater desire for a solo sexual activity than the non-depressed women. Antidepressants such as Prozac or Zoloft often have sexual dysfunction as a side effect in women. Many drugs, especially anti-hypertensives and the quantity and frequency of alcohol and nicotine intake can have a profound effect on sexual performance (5).

Sexual angedonia

Sexual angedonia is one of the marks of angedonia in depressive state. It is due to sexual disharmony and is accompanied by a wider spectrum of sexual problems, for example: anorgasmia, dyspareunia, marital disharmony and others. In sexual angedonia, there is absence of sensation (emotional and physical) during sexual foreplay and intercourse, lack of enjoyment in sexual communication, sometimes to unpleasant and even disgusting feelings during sexual act (6). These authors also reported that there are some who exaggerate the estimate of sexual pleasure, sexual norms and orgasm sensations. They think orgasm must be prolonged for a longer time and that they should feel strong muscle spasms, which causes disharmony in enjoyment of sex. Many older women reported feeling sexually frustrated at the lack of an available sexual partner. Although masturbation is a viable option, but older persons may have been brought up to believe that masturbation is unnatural or even unhealthy. Education and permission from a health care professional may help to alter such misconceptions (7).

Genital pain

Genital pain during stimulation or intercourse is due to many factors including dyspareunia, adhesions, vaginismus and vasculogenic pain cause inhibitions due to the fear of pain. Especially, vasculogenic pain is a conditioned response that results from associating sexual activity with pain and fear. It is a severe problem for many women, who may experience not only extreme physical pain on attempted penetration but also severe psychological pain. It consists of a phobia of penetration of the vagina and involuntary spasm of the pubococcygeal and associated muscles surrounding the lower third of the vagina (8).

Interpersonal relationship

The nature of interpersonal relationship, marital conflict, relationship imbalances, commitment issues, intimacy and communication problems, socio-cultural evils, lack of trust, mismatches in sexual desire, boredom, and poor sexual technique are some of the common sources of sexual dissatisfaction noted among couples of all ages (9).

Age and Menopause

Psychologically, achieving menopause for many women is loss of self-image, self-esteem and a feeling of being less feminine and less attractive to their partners (10, 11). Many older women report feeling sexually frustrated at the lack of an available sexual partner (7).

Surgical operations - The surgical interventions of gynecologic and breast cancer or vulvovaginal surgery often have a deleterious effect on sexual function in women, who are sensitive about their self-esteem (12). Although, these surgeries affect women of all ages, the psychological damage

may be further compounded in older women whose body image is perhaps already affected by age-related body changes (12, 13). The surgical excision of uterus causes another psychological trauma for women undergoing hysterectomy, who feel loss of feminine esteem and a damage of body image, which might interfere with regular sexual function (13).

Treatment strategies of psychological and psycho-social aspects

To grow the size of breasts, a number of creams and drugs are commercially available. These include breastique, breast nourishment cream and grobust lotion for firmer and larger breasts (14). Many women with gigantomastia get reconstructive surgery. There is always fear of losing the sensitive areas in this surgery, however; Harbo (1) found advances in surgery to retain sensitive (nipple-areolar complex) part of the breast. The only treatment for clitoromegaly is surgical excision of a part of clitoris, without losing the sensitive areas (2).

To control obesity in women the strategies to be adopted are diet control and exercise. The natural products used against obesity are Ginkgo biloba, java tea, herbal slim, apple cider vinegar, psyllium husks, flax seed oil, Prim' rose oil, salmon oil, spirulina, ephedra, green tea, cayenne, butcher's broom, cinnamon, chlorella, schizandra, suma, garcinia, cabogia plant, fennel, fenugreek, guarana, Siberian ginseng, turmeric and Aloe vera (15). Kwan et al., (16) found extract of Rhizome Rhei (Shubarb) to be very effective against obesity. In a more recent study, Chaput et al., (17) found orlistat and sibutramine to be very effectual synthetic drugs used against obesity. There are a number of natural products (Valerian, St. John's wort, Skullcap, Catnip, Kava, Chamomile, Hoips) (15) and synthetic drugs (diazepam, clobazam and bromozepam) often used against depression.

In loss of sexual desire, a psychogenic aspect is taken up when the medical aspects are thoroughly worked out. Most of the psychogenic treatment is based on cognitive behavioral and psychodynamic approaches based on discussions. The discussions on loss of desire generally involve the feelings of the partners and could detect how she felt as well as, how it should have been felt and hence the differences in sexuality and sexual needs can be explored. It is felt and expected that the other partner also to feel the same way as she feels and to know when she feels the need. With counseling, the aim is to encourage acceptance of difference (8). Thus, psychotherapy by counseling and discussions is the only solution to psychological and psycho-social problems of FSD.

Pathophysiological Aspects

Dyspareunia

Dyspareunia, a very frustrating FSD problem, is a recurrent genital pain associated with sexual activity. The term is used to describe a pain that starts on genital stimulation and aggravates on penetration (18). Repeated sexual pain can set up a cycle, in which fear of pain leads to avoidance of sexual activity that produces it, in turn leads to loss of sexual desire, lack of arousal and failure to achieve orgasm. This can progress to total avoidance of any desire for sexual activity and cause relationship complications (8). The dyspareunia is of three types (i) superficial vulval pain (ii) vaginal pain (iii) deep dyspareunia. The pain in vulva can be relapsing and remitting. Experiences of burning, itching, and stinging, inflamed sensation may be felt not only on sexual stimulation but can be present all the time and triggered by non-sexual activities such as walking. The main causes are vulvities, vulvovaginities, vulvovestibulities, genital herpes, urethritis and atrophic vulvitis, as well as inadequate lubrication and use of topical irritants such as spermicides or latex. Pain is mainly experienced at the entrance to the vagina, however; since the sensory nerve endings are present only in the lower third of the vagina, the pain is carried over (18).

Painful sexual intercourse and inadequate and/or absence of orgasms are the most common complaints of women suffering from sexual dysfunction. The different etiological factors of deep dyspareunia include pelvic inflammatory disease, gynecological pelvic or abdominal surgery, postoperative adhesions, endometriosis, genital or pelvic tumors, fibroids, irritable bowel syndrome, urinary tract infections, ovarian cysts, condyloma, ectopic pregnancies, pathologic conditions due to childbirth, postoperative scarring from gynecologic surgery, vaginal atrophy, vaginitis and vulvar lesions. Another cause is positional impact with initial or deep penetration or deep thrusting by woman's partner hitting the ovary (8, 18). The other etiologies include adrenal pathology; cystitis, inadequate lubrication, pelvic adhesions, congestion or infections; urethral disorders; vaginismus; and vulvodynia (19). Inadequate lubrication, vaginal atrophy, vaginismus and vulvodynia are associated with painful entry. Deep pelvic pain may be due to the partner's thrusting, which hits pain-sensitive structures. Myofascial restrictions and trigger points in the pelvic floor muscles can cause pain and may also serve as a trigger for neurogenic inflammation of the bladder wall. The orgasmic capability and overall sexual response may also be affected by different causes of dyspareunia, such as; clitoral and post surgical adhesions, endometriosis, episiotomy scars, interstitial cystitis, vaginitis, and vulvodynia (20).

Adhesions

Adhesions are deposits of fibrous tissue that form as a natural response to the injury of the tissue after infection, inflammation, surgery or trauma. These adhesions are the bands of scar tissue with the potential to bind organs to other structures, which leads to multiple symptoms including organ dysfunction and/or pain as "pulling" or "stabbing" (21). In addition to being a common outcome of pelvic or abdominal surgery, adhesions are known to accompany associated conditions such as bowel obstruction, chronic abdomino-pelvic pain, endometriosis, pelvic inflammatory disease, pelvic spasms, polyps, and tubal obstruction (22, 23).

Vasculogenic

The first phase of the sexual response in female is associated with the relaxation of smooth muscles under the influence of neurotransmitters. This results in lubrication of the vagina, engorgement of its wall and increase of the clitoral length and diameter. Any physiological impairments of vasculogenic female sexual function will cause failure of lubrication, vaginal engorgement and clitoral erectile insufficiency,

resulting into painful intercourse, lack of clitoral and vaginal sensation and failure of orgasm (24).

Vaginismus:

Vaginismus is another serious problem which cause extreme physical and psychological pain upon penetration (8). The severity of the symptom of vaginismus can lead to a general sexual inhibition with avoidance of any sexual touching, and in most severe cases to avoidance of any affectionate touching. However, some women are sexually responsive and have good quality sexual experiences, with imaginative "foreplay" continuing to orgasm but avoiding penetration. Attempted penetration leads to pain, fear, humiliation and frustration, often resulting in feelings of inadequacy and abandonment (25).

Clitoral erection

Biologically, clitoris is described as the vestigial penis. By structure, it is very insignificant but controls the essence of all the sexual functions. It is main organ of stimulation and is responsible for the trigger of all the phases, including arousal, lubrication, plateau, orgasm and resolution. Beneath the clitoris, in the anterior wall of vagina is present an arousable area called as the Grafenberg zone (GZ). Excitation of GZ is known to give the highest pleasure to women. In addition the stimulation of this body has been described to discharge a viscous fluid (a phenomenon which is referred to as female ejaculation) from the urethra (26).

The main symptom of arousal disorder in women has been described to be a deficient vaginal lubrication, making sexual intercourse, unpleasant. This disorder in female is related with inadequate erection of the clitoris similar to loss of erectile function of penis in man (27). The erectile function in clitoris and/or the penis is known to result from similar mechanisms, involving damages in the vascular and autonomic nervous system, as well as alteration in the nitric oxide production and efficacy (27). In an earlier study on the isoforms of nitric oxide synthase in the human clitoris, Burnett et al., (28) reported that the presence and anatomical localizations of nitric oxide synthase isoforms in human clitoris confirm that nitric oxide is generated in this organ. The study suggested that nitric oxide may be involved in the erectile physiology of the clitoris as a modulator of clitoral smooth muscle activity. The tissue organization in corpora cavernosa of the clitoris is essentially similar to that of penis except for the absence of sub-albugineal layer interposed between tunica albuginea and erectile tissue (29).

Anorgasmia

The role of orgasm for women is not well defined. Actually there are 2 types of orgasms, these are (i) clitoral orgasm and (ii) vaginal orgasm. The clitoral orgasm, is common and occur within a short period of sexual intercourse. Most of the orgasms, experienced are clitoral. The vaginal orgasm takes longer time and sometimes never happens to many women in their life time, if the GZ is not properly stimulated (26). For some women, the orgasm is extremely important and sought at every sexual encounter. However, for others it seems less important and sometimes of little relevance; many women can be quite satisfied without it. An important issue is the understanding of the male partner, who often feels that, like him, his partner cannot fully enjoy sexual activity without orgasm. Hence, there is an enormous pressure on the woman to achieve orgasm. There is another problem, wherein the woman may have a strong sexual desire with good arousal and enjoy the sensation of the penis in the vagina, but have a strong fear of losing control over feelings and behavior and wish to achieve orgasm by masturbation but not in coupled sexual activity (8, 26). The fear can be conscious or unconscious, but resolution of the conflict is an important aim of treatment. An example of a situational anorgasmia is a woman who can achieve orgasm by masturbation but not in coupled sexual activity (8).

Hormones

Deficiency of testosterone has been described as one of the factors for loss of sex desire. The production of testosterone in female is evenly between ovaries and the adrenal glands. Women, who have undergone hysterectomy or bilateral sapingo-oophorectomy often, suffer androgen deficiency. The use of anti cancer drugs is also known to cause deficiency of testosterone (30). Although there is no absolute level of testosterone necessary for sexual desire, it has been suggested that there is a threshold level of circulating androgen below which the intensity of desire is affected (30). When at menopause, estrogen levels decline, the levels of follicle-stimulating hormone and lutenizing hormone increase in an effort to stimulate estrogen production. The increase in these two hormones stimulates certain cells in the ovarian stromal tissue to produce testosterone (10). Declining estrogen and testosterone affect sexual desire, sexual response, and urogenital health and the commonly reported sexual problems include change in sexual desire and dyspareunia (32, 33).

Prolactin is reported to represent a peripheral regulatory factor for reproductive function in both men and women. This is like a feedback mechanism that signals CNS centers controlling sexual arousal and behavior. Chronic elevations of prolactin (hyperprolactinemia) produce pronounced reductions in sexual activity, and significant reduction of libido and gonadal function in both men and women (31).

Diseases

Any health problem that might affect sexual anatomy, vascular and neurological systems, obstetric and gynecology, urology and the endocrine systems may cause loss of sexual desire and interfere with any phase of FSD (34). Additionally, surgical treatment of gynecologic and breast cancer, vulvovaginal surgery often has a deleterious effect on sexual function in women and interfere with normal sexual response (12). Dyspareunia is an indirect etiological factor that cause chronic pain, fatigue and malaise and interfere with vascular and neurological pathways (8). There is a paucity of studies on the effects of diabetes on female sexual function. In an investigation on 6 studies of 6 comparing diabetic to non diabetic females, an increased prevalence of female sexual arousal disorder has been reported. The main symptom was a deficient vaginal lubrication, making sexual intercourse unpleasant (34). Roughan et al., (30) reported decreased sexual desire, anorgasmia and difficulty in obtaining sufficient vaginal lubrication during sexual arousal in some women with

type II diabetes mellitus (30). The duration of diabetes, age, or insulin dosage does not appear to be correlated with sexual function among women with diabetes and there is no evidence that peripheral or autonomic neuropathies directly affect the female sexual response (30). Urinary incontinence occurs in up to 25% of older women during intercourse (12). This disorder commonly leads to dissatisfaction with the sexual relationship or withdrawal from sexual contact due to embarrassment. Renal failure has been reported to cause anorgasmia, decreased libido and impaired vaginal lubrication in women on dialysis (13).

Drugs and Alcoholism

Antipsychotic, neuroleptic and antidepressant medicines are known to impair sexual function in women. Side effects associated with antidepressant medications include decreased sexual desire, impaired arousal and lubrication, vaginal atrophy, vaginal anesthesia, delayed orgasm and anorgasmia (35). Antihypertensive drug, clonidine has been shown to impair physiologic sexual response in women by decreasing vaginal blood volume and pulse pressure responses (36). Use of drugs, such as, hypotensives, hypertensives, and nicotine has been reported to cause decreased sexual desire, vaginal atrophy and dryness, impaired arousal and lubrication, vaginal anesthesia, delayed orgasm and analgesia leading to pain during sexual intercourse (35, 36, and 37).

In a study on alcoholic women, Kinsey (38) reported seventy percent to have sexual dysfunction. In another, study alcoholic women, 75 percent reported difficulty in achieving orgasm, nearly half had become anorgasmic (39). Sexuality and partner relationships were found to be more stressful and conflicting among women alcoholics (40). There is always an element of phobic avoidance of sexual encounters or creation by women of a destructive erotic atmosphere that can produce disorders of sexual desire. Roman (41) found alcohol to cause dysmenorrhea, heavy menstrual flow and premenstrual discomfort, in addition to FSD.

Urological complications of coitus

Coitus, although pleasurable, may be risky. The urological complications of coitus have been reported to be mostly due to peno-vaginal disproportion, excessive force at coitus, or deviations from the normal route, such as urethral coitus and anal intercourse The complications, experienced by women include urethral injuries, vesicovaginal fistulae, bladder and cavernosal ruptures and urinary tract infections (42).

Hysterectomy

Hysterectomy is the most commonly performed operation in case of pathological changes in the uterus. The surgery has been shown to interfere with the intensity of orgasms, due to loss of uterine contractions (13). However, it improves the sexual function due to relief from the trauma of pain, abnormal bleeding or cramping.

Menopause

Menopause occurs in most women at about age 50. It is associated with substantial reductions in estrogen, progesterone and androgen levels, which cause decreased vaginal lubrication or a thinning of the vaginal lining, both of which may lead to pain during vaginal intercourse (11). Following menopause, estrogen is almost exclusively derived from the peripheral conversion of adrenal androgens. The decreased estrogen levels have a multitude of effects on sexual function, including (i) decreased support of female pelvis, (ii) loss of ability to adequately lubricate the urinogenital tissue, (iii) urinogenital atrophy, (iv) thinning of the vaginal lining and (v) changes in body configuration, which affects skin, breasts, muscles and skeleton. All these factors contribute, directly or indirectly to FSD (10, 43).

Sexual activity in Aged women

Generally menopause is considered as a stage when the women, becomes sexually sluggish, however; lively and energetic sexual activity is continued much late in the life in more than two-third women. Although, the middle-aged and older women are reported to engage in satisfying their sexual activity, a recent study (44) reported at least one-third middle aged and older women have serious problems with sexual function. The categories of FSD among aged women are reported to be the disorders of desire, arousal, orgasm and sexual pain (45). The main problem in the aged women has been related to erectile dysfunction of the clitoris. Age-related structural changes are observed in human clitoral cavernosal tissue, in addition to deficits of adrenal androgen production (30, 46). In a study on histomorphometric analysis of clitoral cavernosal tissue of aged women, Tarcan et al., (46) found aging women undergo drastic changes in the histology of clitoral cavernosal erectile tissue due to etiology of the vascular risk factors. These changes are known to cause disorders of desire, vaginal lubrication, arousal, orgasmic response, reduction of vaginal and rectal contractions, sexual pain with burning sensation and post coital bleeding (4, 45, 47, 48).

Laumann et al., (49) found 43% of the aged women reported sexual dysfunction, encompassing lack of interest, inability to achieve orgasm, pain with sex, lack of pleasure, anxiety and trouble lubricating. In a cohort of older postmenopausal women (mean age 68 years) with osteoporosis, baseline data showed that 46% reported some sexual activity, and among those women the most reported problem was difficulty with orgasm (50). Around age 65, there is a further decrease in adrenal androgen production, often referred to as adrenopause (30). The decline in estrogen that accompanies menopause leads to a number of age-related changes in genital appearance. Such changes include a reduction in pubic hair, loss of fat and subcutaneous tissue from the mons pubis, atrophy of the labia majora and shortening and loss of elasticity of the vaginal barrel. Vaginal secretions decrease in quantity due to atrophy of the Bartholin glands and a decrease in the number and maturity of vaginal cells. Together with decreased vaginal lubrication, the reduction in thickness of the epithelium may lead to post-coital bleeding, mild burning sensations during intercourse and pain (47). With decreased estrogenic stimulation, the uterus is reduced in size and the total collagen and elastic content decreases by 30% to 50% (51). A number of age-related changes affect the female sexual response cycle. During the excitement phase, vaginal blood flow and genital engorgement are less intense resulting into delayed and reduced quantity of vaginal lubrication (48). The decrease in vaginal vaso-congestion and

lubrication may contribute to dryness of the vagina and may make intercourse painful (10). The plateau phase of sexual response is prolonged in older women, uterine elevation is reduced, the labia majora do not elevate to the same degree as in younger years, the breasts become less vasocongested and nipple erection is less likely to occur (30). The orgasmic response does not appear to be substantially affected by age. Women retain multi-orgasmic capacity, although the number and intensity of vaginal and rectal contractions are reduced (7). The resolution stage of sexual response in older women is characterized by rapid loss of vasocongestion.

Treatment strategies of Pathophysiological disorders

The treatment of dyspareunia includes a site-specific and manual soft-tissue therapy, which cause soft-tissue mobility, elasticity and distensibility to improve inhibited orgasm. The mobilization of the soft tissue appears to break down the collagenous cross-links and adhesions that cause pain and dysfunction (25). The natural products available with GNC for improvement of sexual function in women are horny goat weed, Ginkgo biloba, Lobelia, Dong qui, phyto-estrogen, Royal Ginseng for women and DHEA (15). In addition there are some products that are used against menopause, these are; black currant seeds, primrose oil, soy proteins, Aloe vera juice, Ginkgo biloba, slippery elm, damiana, blackcohosh, fennel, raspberry, wild yam, chick weed, nettle, dandelion, chamomile, valerian, Siberian ginseng, coenzyme Q10 and lecithine (15). In a clinical study, Waynberg and Brewer (52) reported that the herbal formulation of Muira puama and Ginkgo biloba (Herbal vX) showed significant improvements in the intensity of sexual desires, sexual intercourse, sexual fantasies and ability to reach orgasm. Kyo-green, a green powdered nutritional supplement, is reported to improve sexual dysfunctions in women. It was found to increase the energy levels and increase libido in women suffering from lack of libido (53).

For men, Viagra is considered effective and works through the nitric oxide-cyclic guanosine monophosphate pathway involved in penile erection, this concept was also used for erectile dysfunction of clitoris. In a study on Viagra on clitoris and uterus, Erkan and Ya, (54) found that it improves blood flow to these organs and cause abundant sexual arousal. Studies on its mechanism of action are yet to be reported. Arginine, a well known, precursor to nitric oxide, is a key component of endothelial-derived relaxing factor, an endogenous messenger molecule involved in a variety of endothelium-dependent physiological effects. Because of arginine's NO-stimulating effects, it can be utilized in therapeutic regimens for erectile dysfunction of the clitoris, in addition to angina pectoris, congestive heart failure, hypertension, coronary heart disease, and preeclampsia (55). Bupropion targets the central nervous system to help women achieve orgasm (56).

In postmenopausal and aged women, who have reduced lubrication and complain of pain due to thinning of vaginal lining, estrogen or lubricants are the best cure to relieve the symptoms. For aged women, non-hormonal preparations such as Replens or oil from a vitamine E capsule are applied vaginally to alleviate dryness (10). Hormone replacement therapy is given to ameliorate the local anatomic and physiologic changes in postmenopausal and aged women. Estrogen replacement therapy, when given systemically at high doses, has a beneficial effect on urinogenital tissue (47), but this is associated with an increased risk of breast and endometrial cancer.

Treatment with testosterone can improve loss of desire. However, its use should be strictly under medical supervision and control. Since the use of androgen is known to affect cholesterol and liver protein levels, at high doses, it may also cause masculinizing effects, such as facial hair or lowered vocal pich (10). Adrenal androgen DHEA has been found to be linked with sexuality and well being of women (57). DHEA is a pro-hormone that is secreted by the cortico-adrenal glands similar to testosterone. In an earlier study Belaisch, (58) has shown that DHEA becomes estrogen and androgen and in women its action is mainly an androgenic and works on improvement of libido. However, it is known to have negative effects on breasts and prostate. To reduce the prolactin levels and improve sexual function, the most effective treatment is bromocriptine to improve sexual activity (31).

To increase vaginal and clitoral blood flow in patients with FSD, there are a number of oral and topical pharmacologic strategies available. These are (i) phosphodiesterase inhibitors cause genital vaso-congestion in women with minimal clinical efficacy (ii) androgens increase libido (iii) bupropion targets the central nervous system to help women achieve orgasm (24, 54, 56) (iv) several natural products improve FSD (15). Nevertheless, hitherto, there has not been any therapy (approved by American Food and Drug Administration or the European Health Regulations) to guarantee clitoral engorgement, sexual arousal and overall sexual satisfaction. Due to lack of proper medication, some mechanical and electrical devises have been invented to treat sexual arousal and orgasm disorders and to increase the sexual response. These devices work through vibratory stimulation or by vascular engorgement in the clitoris, by using a vacuum system (56). The world health authorities have approved the Eros Therapy Device (Uro Metrics, Inc., St. Paul, Minn., USA) which is a small battery-powered device. This is used to apply direct vacuum over the clitoris causing the clitoral erectile chambers and labia to fill with blood (56, 59). The treatments for the urinogenital complications include cold compress and anti-inflammatory agents in contusions, repairs of lacerations, closure of fistulae and urethral and vaginal reconstruction. Abstinence is supposed to be the best remedy (42).

CONCLUSION

The problems of FSD are inexplicable disorders that can cause considerable anguish, sorrow, sufferings and relationship problems. The different phases (desire, arousal, lubrication, plateau, orgasm and resolution) of sexual response in women are all interdependent. The etiologies of FSD are both psychological, psycho-social and pathophysiological conditions. While, both natural and synthetic antioxidants play a vital role in the treatment of organic disorder, a number of drugs (synthetic and natural) such as DHEA, bupropion, arginine, kyogreen, phytoestrogens, dong qui,

horny goat weed, Lobelia, damiana, Siberian ginseng and herbal formulation of Muira puama and Ginkgo biloba (Herbal vX) are popularly used by women to have a beneficial effect. Recently, Viagra has gained importance to increase vaginal engorgement and clitoral erection, by increasing blood flow to clitoris and vagina. To alleviate vaginal dryness, commercially available creams and oils are used, including Replens or oil from a vitamine E capsule that is applied vaginally every other day. The other measures of treatment are hormone replacement therapy and the small battery-powered devices that are used to apply direct vacuum over the clitoris causing the clitoral erectile chambers and labia to fill with blood to treat sexual arousal and orgasm disorders. We analyze that the FSD is a common problem among women, irrespective of age and suggest that the women health providers should periodically examine the sexual activity of their patients. There should be a thorough screening for FSD and expert consultation be provided for treatment and counseling. Especial emphasis should be given to the introvert nature of women and the approach of treatment has to be modified to establish contacts through telephone and/or e-mail for diagnosis, treatment, discussions and counseling. Lastly, but not the least, conduct of some studies on social sciences are recommended to identify the socio-cultural factors that have a negative impact on sexual function in women. In addition, it is also imperative to inculcate awareness of sexual health in women.

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