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Chemotherapy and Related Female Sexual Dysfunction: A Review of Literature

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Abstract

Context: Cancer is a detrimental illness that affects patients' quality of life and other aspects of a healthy life. Chemotherapy has been shown to have a direct and indirect effect on the sex organs of women.

Evidence Acquisition: We searched in databases including PubMed, Scopus, and Google scholar. The keywords for our search were as follows: "Chemotherapy" OR "Cancer treatment" AND "Sexual dysfunction "OR "Sexuality" OR "libido" OR "dyspareunia" OR "orgasmic disorder" OR "sexual disorder". We evaluated the articles based on their abstract and 92 studies were selected and used in the present study.

Results: Chemotherapeutic agents damage ovaries and could cause premature ovarian failure. Furthermore, chemotherapy disturbs the femininity aspects of patients and reduces their libido. In this review article, we aimed at a better understanding the effect of chemotherapy on the sexual function of female cancer survivals.

Conclusions: In conclusion, chemotherapy is one of the most common cancer treatments affecting sexual health aspects, such as decreased libido, arousal and orgasm, dyspareunia, dysfunction of the sexual response cycle before puberty, and vulvovaginal atrophy. However, many patients are reluctant to discuss their sexual problems.

Keywords: Female, Sexual Dysfunction, Chemotherapy, Cancer

1. Context

Advanced science in the early detection and treatment of cancer leads to a significant increase in cancer survivors. Nevertheless, the cancer treatment process aiming at accelerating recovery reduces the risk of cancer recurrence, causing short-term and long-term side effects in survivors (1). Chemotherapy, known as one of the conventional methods of cancer treatment, promotes healing, increases life expectancy, and reduces the risk of cancer recurrence; however, it affects survivors' physical, mental, and social aspects (2). Since most patients with cancer are successfully treated, and their life expectancy has increased, more attention has been paid to cancer survivors' needs (1). Women undergoing cancer treatment often complain of sexual health and problems with their partners (3). As a result, sexual dysfunction is one of the most common problems among cancer survivors. Most reported sexual dysfunctions among cancer survivors to include decreased libido, arousal, and orgasm; dyspareunia, dysfunction of the sexual response cycle, pre-mature due to hypoestrogenism, as well as vulvovaginal atrophy due to decreased and delayed vaginal discharge during sexual intercourse. Therefore, sexual health is a major concern for women surviving cancer (2).

Specialized centers have been established to meet survivors' needs. Despite these centers, many cancer survivors rarely intend to discuss sexual issues or problems (4). Extensive studies have examined the barriers preventing oncologists from proper communication with patients about the sexual concerns of women with cancer. According to several studies, lack of proper sexual health education, limited time, concerns about abuse of patients by discussing these issues, uncertainty in how to manage and deal with this issue, and inability to find the right language to address sexual health are some reported barriers for oncologists to communicate with patients. In addition, the adverse functions of sexual response may affect mental and social health, including self-confidence, self-esteem, feeling healthy, life satisfaction, and appropriate

social interactions (5). Due to the lack of standard guidelines and insufficient information and knowledge of patients undergoing chemotherapy about the adverse effects of chemotherapy on sexual health, in this review, we aimed at providing more information and data on the effects of chemotherapy on women's sexual health.

2. Evidence Acquisition

To prepare this narrative review, we searched databases including PubMed, Scopus, and Google scholar. The search keywords were as follows: "Chemotherapy" OR "Cancer treatment" AND "Sexual dysfunction "OR "Sexuality" OR "libido" OR "dyspareunia" OR "orgasmic disorder" OR "sexual disorder". We evaluated the articles based on their abstract and 92 studies were selected and used in the present study. Eligible studies included original studies such as randomized clinical trials (RCTs) and observational studies that evaluated the effects of chemotherapy on female sexual dysfunction and other systematic and narrative reviews that collected required data in this field. We made no restrictions on the language and time of studies.

3. Results

3.1. Effect of Chemotherapy on Ovarian Function

Chemotherapeutic agents induce ovarian atrophy and depletion of primordial follicles. Since, at birth, each ovary contains finite primordial follicles, patients undergoing chemotherapy experience premature ovarian failure (POF) and menopause. To explain the mechanism of injury, it has been indicated that chemotherapy leads to blood vessel damage and cortical fibrosis of ovaries, resulting in local ischemia and depletion of primordial follicles. Another mechanism by which chemotherapy exerts anti-ovarian function is follicular apoptosis, leading to follicular atresia and follicular depletion (6, 7). The extent of chemotherapy-induced ovarian damage depends on the type of chemotherapy drug, dose, and patients' age (7). Women aged 35 years or older showed faster and greater damage compared to younger patients. In addition to depletion of primordial follicles and POF, which is considered a long-term effect of chemotherapy, amenorrhea occurs as a short-term effect, but it may be reversible. Although younger patients experience amenorrhea as a temporary effect terminated after the course of treatment, older patients may experience anticipated menopause. Chemotherapy-induced amenorrhea (CIA) often occurs through the administration of alkylating agents (7).

Patients undergoing chemotherapy may also experience premature menopause (PM), which is defined as menopause occurring before the age of 40 and POI. PM can affect patients' health and sexual function. Age at PM determines the complexity of patients' health and sexuality. The earlier occurring time of PM, the more complex impacts would occur. PM critical consequences, such as cutaneous changes, body image and body shape concerns, and weight gain lead to reduce self-confidence and self-esteem and cause sexual dysfunction (7, 8). A study of 80 POI patients indicated that almost all aspects of female sexual life, such as arousal, lubrication, orgasm, satisfaction, and pain were significantly impaired except for the disturbing feelings of desire (8). A cross-sectional observational study conducted on 25 POI patients demonstrated that the patients' libido and sexual response were lower than the control group's (9). A study on 81 patients with POI reported that the women suffered from reduced lubrication, increased genital pain, and decreased sexual arousal. However, sexual desire and frequency of sexual activity were not impaired (10). To better understand the association between PM and sexual dysfunction, the physiological function of estrogen and androgen should be considered. Estrogen plays a central role in sexual desire, mental arousal, lubrication, and orgasm. Reduced level of estrogen occurring in PM contributes to impaired sexual response and sexual desire. In addition to estrogen, levels of testosterone and other types of androgen decrease in PM. Testosterone is one of the main modulators in central arousal and induces the production of nitric oxide (NO) as the main contributor to the process of congestion of the clitoral body. It has been shown that a higher level of total testosterone is associated with frequency of sexual desire and similarly, a higher level of androstenedione is associated with frequency of sexual contact. Furthermore, sexual hormones contribute to neurobiological functions, therefore the reduced level of these hormones causes depression and anxiety in patients and impairs the neurovascular cascade of sexual response. An observational study on 25 patients with spontaneous POI, 17 patients with menopause induced by surgery, 12 patients with menopause induced by chemotherapy, and 23 women in the control group demonstrated that depression, anxiety, body image, and self-confidence were impaired in all groups with POI patients (8). A growing body of evidence revealed that androgens and estrogen contributed to increased collagen and elastin, prevented thinning of epithelium, reduced elasticity, and resulted in proper genitourinary function. These physiological actions are also evident in vaginal tissue, labia majora, labia minora, vestibule, and other anatomical parts of the genitourinary system and explain the reduced sexual function in low androgen condi-

tions like POI. Other complications of POI are urogenital atrophy, vaginal dryness, vaginal irritation, and itching (8). Tamoxifen appears to have a positive effect on breast cancer survivors' sexual function, reduce their fear of sexual activity, and ameliorate sexual dysfunction impacts of Gonadotropin hormone-releasing hormone (GnRH) agonist in these patients (11). Luteinizing hormone-releasing hormone (LH-RHa) analogues appears to have an ovarian protective effect on breast cancer survivors (12). Animal studies have demonstrated that LH-RHa can decrease the follicular depletion caused by cyclophosphamide (CPA) administration (7).

3.2. Vaginal Atrophy and Dyspareunia

Sexual health concern is among the most survivorship issues that are not well addressed in the care of cancer patients. One of the chemotherapy-induced sexual side effects is atrophic vaginitis, which is due to reduced levels of circulating estrogen in the urogenital system (13, 14). By the literature, 20% of pre-and postmenopausal patients with breast cancer refused to use antihormonal therapy, probably owing to chemotherapy-induced side effects like vulvovaginal atrophy (VVA). VVA is an important issue in patients with cancer, affecting 60% of women with postmenopausal breast cancer and 40% of younger patients with breast cancer (15). Anatomical regions such as the vulva, vestibule, labia majora, labia minora, and vagina have a high concentration of estrogen receptors (16). Therefore, a reduced level of circulating estrogen leads to decreased vaginal lubrication and dyspareunia. Presentation of the vaginal atrophy includes thin, pale, and dryness of vaginal wall. Decreased vaginal elasticity, loss of vaginal rugae, and vaginal narrowing are other presentations associated with vaginal atrophy. Symptoms includes dryness of vagina, pain, and bleeding during sexual intercourse, itching, irritation, burning, discharge of vagina, and problems related to the urinary system (such as increased frequency, urgency, incontinence, and infection) (17) can have negative impacts on a patient's life quality and well-being, particularly in the context of sexual function (18). Lack of lubrication during sexual activity leads to dyspareunia, which can cause avoidance of sexual intercourse and further presentations of vaginal atrophy (19). Dyspareunia is usually classified as superficial or deep and is defined as a recurrent or persistent sexual pain that can occur before, during, or after intercourse. Pain location in superficial dyspareunia is in the vulva or vaginal entrance, while pain in deep dyspareunia is located mainly in the lower pelvic regions and inside the vagina (20). Minimal trauma could cause patients with vaginal atrophy to experience bleeding, including during a medical examination or exercise (21). In one study conducted on 243 gynecological cancer female survivors, 164 (67%) patients developed dyspareunia, 132 (55%) patients reported superficial pain, 97(40%) women reported deep pain, and 87(36%) women reported both types of dyspareunia (22).

Typically, vaginal atrophy could be diagnosed by clinical examination. Many women exhibit dry, glazed-looking vaginal epithelium, thinning cervix, loss of labial fat pad, and vagina with reduced elasticity. Moreover, these patients have a narrowed vagina that becomes less distensible and can be easily traumatized and irritated (17). In addition, in a healthy and pre-menopausal woman, estrogen induces exfoliation of vaginal cells. As a result, exfoliated cells release glycogen, and then glycogen is hydrolyzed to glycose. Vaginal bacteria, including lactobacillus, convert glucose to lactic acid, which could maintain the vaginal PH between 3.5 and 4.5. Therefore, patients receiving chemotherapy report an altered vaginal pH. In conclusion, vaginal PH or the vaginal maturation index (VMI) could contribute to the diagnosis (23). Appropriate therapy for symptoms of vaginal atrophy could help to improve sexual dysfunction among younger cancer survivors.

3.2.1.Therapeutic Approaches to Vaginal Atrophy and Dyspareunia

3.2.1.1. Non-hormonal Therapy for Improvement of Dyspareunia and Vaginal Atrophy

lifestyle adjustment and non-hormonal are the first-line therapies for dyspareunia (24). Among these treatments, quiting smoking may reduce vaginal atrophy caused by enhanced capillary refill (17, 25). Other sexual activities such as regular coitus, cuddling, and masturbation could improve vaginal PH and vaginal blood flow (17). In addition, lubricated fingers and vaginal dilators could be penetrated vagina, resulting in improvement of fibrotic changes and stretching of tightened vaginal walls. Stress management may be beneficial to decrease the stress associated with intolerable introitus insertion and fear of painful coition (26). Non-hormonal treatments are considered first-line therapy for relieving symptoms of vulvovaginal dryness and related dyspareunia in cancer female patients, and exclusively in those with hormone-dependent cancer. These treatments include vaginal moisturizers and lubricants, topical anesthetics, vaginal pH-balance gel, pelvic floor physical therapy, and psychological counseling that seems to have a significant effect on sexual activity, assessment scores of vulvovaginal health, and pH of the vagina compared to baseline (27).

3.2.1.2. Lubricants and Moisturizers

Lubricants reduce friction against thinned and atrophic genital tissue. therefore, relieving discomfort and pain. These are available as a water-silicone-, mineral oil-

or plant oil-based products (28). External lubricants can be administered on the labia, clitoris, the opening of the vagina, and penis. The efficacy of external lubricants redoubles with concomitant administration of intra-vaginal lubricants (29). Regular usage of vaginal moisturizers could prevent vaginal pain and general atrophy. Plant-based or synthetic polymers moisturizers hydrate the vaginal mucosa, lower the vaginal pH and improve vaginal dryness when compared with vaginal estrogen therapy (30, 31).

3.2.1.3. Lidocaine

Another non-hormonal treatment is topical lidocaine. In a randomized controlled trial, conducted on breast cancer survivors, applying 4% aqueous lidocaine for 3 minutes before vaginal penetration for two months, reduced pain of vaginal penetration and improved sexual function in the experimental group compared to the control group (32). A possible mechanism involved in dyspareunia is hyper-sensitization of peripheral vestibular nerves. Therefore, lidocaine and other topical anesthetic desensitize the peripheral vestibular nerve and relieve pain and discomfort (33, 34). It has been shown that administration of topical 5% lidocaine once or twice per day achieves relief of pain after 6 to 8 weeks of administration (34).

3.2.1.4. Micro-ablative Fractional CO2 Laser and Non-ablative Vaginal Erbium YAG Laser

Micro-ablative fractional CO2 laser and non-ablative vaginal Erbium YAG laser have been used in both women with or without a history of cancer treatment who have the genitourinary syndrome of menopause (GSM). The mechanism of action of laser therapy is based on the synthesis of collagen and significant symptomatic improvement in pain, dryness, dyspareunia, and sexual function (35, 36). Limited data suggests that laser therapy is effective in cancer survivors (37-39). Nevertheless, in one study, several side effects including pain, scarring, and sexual issues after laser therapy have been reported (40).

3.2.1.5. Hormonal therapies

Topical estrogen could be locally administered to the vulva and vagina through the cream, ring, insert, or tablet. In healthy women, local estrogens may be more efficient for symptoms of vaginal atrophy than systemic therapy and need a lower dose and systemic absorption (41-43). Vaginal creams containing estrogen, intravaginal tablets containing 17β estradiol, estriol containing pessaries, vaginal rings containing releasing estradiol, and estrogen-embedded intrauterine devices are other available forms of this product. These available preparations can be different in bioavailability level and degree of systemic absorption. Conjugated estrogen cream has the greatest degree of systemic absorption among all topical vaginal therapies. Therefore, its use should not be administered in women with breast cancer (17, 44, 45).

3.3. Sexual Desire

Chemotherapy induces various sexual issues, such as dyspareunia, fatigue, vaginal dryness, reduced sexual desire/interest, reduced sexual arousal, and difficulty achieving orgasm (46). These symptoms appear to be related to permanent or transient premature menopause induced by chemotherapeutic agents. Sexual desire disorders are the most important sexual difficulties and include experiencing a lack of sexual pleasure for sexual activity, inability to initiate or respond to sexual activity, absence/reduction of sexual thoughts, lack/reduction of pleasure during sexual intercourse as well as absence/reduction of interest in internal or external erotic cues. Sexual issues among female patients with cancer appear to be varied when patients receive chemotherapy (47, 48). Recent data have demonstrated that chemotherapeutic drugs like GNRH analogous are related to sexual dysfunction, while tamoxifen alone appears to be unrelated to sexual issues (47, 48).

Estradiol and testosterone are known as critical steroids for modulating sexual desire in women. So far, there are no FDA-approved androgen therapies for women. However, testosterone is frequently prescribed off-label for treating women with low sexual desire (49). Moreover, in premenopausal women with hypoactive sexual desire disorder (HSDD), flibanserin 50 mg and 100 mg once daily is associated with significant improvements in women with HSDD (50).

3.4. Body Image and Chemotherapy

Body image is commonly defined as a subjective assessment of an individual's own physical appearance based on self-observation and by noting the reaction of others (51). Cancer survivors experience marked alterations in their physical appearance following chemotherapy. These alterations include hair loss, alopecia, weight gain due to systemic hormone therapy, and other side effects of chemotherapy that have negative effects on the individual's assessment of self-appearance related to femininity. Among these side effects, alopecia is the most distressing disorder that is considered a harder experience compared to breast losing (52). Body image concerns among cancer survivors would lead to decreased self-esteem, anxiety, and symptoms of depression. Furthermore, since body image directly affects attractiveness and sexual functions, female

cancer survivors develop the poor sexual function and disturbed sexual response. Similarly, because hair is a critical indicator of attractiveness and femininity, chemotherapy-induced alopecia (CIA) can significantly lead to sexual dysfunction and poorer sexual desire (52). Moorey et al. revealed that depression, feeling embarrassed, and reduced self-confidence were related to alopecia among breast cancer survivors. According to this study, 68% of young women with breast cancer reported sexual dysfunction, and altered body image was related to satisfaction with sexual activity (53). Negative body image causes female cancer patients to feel withdrawn, unattractive, and embarrassed (54). Therefore, adequate social support is required to cause patients to feel free about sharing their concerns and problems during cancer therapy. Patients also should be helped to improve their self-confidence and quality of life, become more optimistic, feel comfortable expressing their wishes, decrease their social isolation, and be encouraged to become physically and psychologically adapted. Moreover, partners could help patients by listening to their feelings, spending more non-sexual time with their spouse, and reestablishing intimacy. Partners should understand that intimacy is not always accompanied by sexual activity, but it involves kissing, hugging, sharing feelings, and communicating with the partner (55). Another important aspect that should be considered is a social negative attitude and stigmatizing views toward cancer survivors. Based on a theory proposed previous studies, these social negative views toward patients with cancer could even make their body image worse (56, 57). According to a national survey in Korea, 35.2% of participants maintained that patients with cancer would be easily recognized in public and 42.3% of participants believed that they were not comfortable when they were with these patients (58). The following recommendations would help female cancer survivors to accept their new body image and increase their self-esteem (59):

(1) Patients should practice great self-esteem

(2) During and following the completion of treatment, patients should have physical activity and weight training courses to improve their body image and self-esteem

(3) Patients could participate in psychological interventions

(4) Oncologists should inform patients about body image alteration and psychological consequences

3.5. Psychological Concerns and Chemotherapy

Depression and anxiety are considered the most important psychological issues in patients undergoing chemotherapy compared to patients with other types of medication (60, 61). Chemotherapy-related pain, sleep disruption, fatigue, and menopause symptoms are also listed as consequences of chemotherapeutic agents (62). The sign and symptoms related to pain, depression, anxiety, and fatigue presented in the female cancer population could be associated with high levels of pro-inflammatory cytokines release from tissues damaged during chemotherapy. As estrogen enhances the sensitivity of brain to serotonin, a rapid decline of estrogen in female cancer survivors is associated with symptoms of depression (63). Moreover, chemotherapy has a negative effect on frontal neural networks responsible for attention and executive functions (64, 65). Interestingly, these are the same brain regions stimulated by appetitive stimuli, including erotica (66). Briefly, it can be concluded that both biological (such as altered levels of hormones, pain, fatigue, and hair loss) and physiological factors (such as altered body image, anxiety, and depression) contribute to sexual dysfunction in patients undergoing chemotherapy.

Femaleness, negative body image, loneliness, and other comorbidities are listed as risk factors for developing depression (67). Clinicians should note that sexual dysfunction and depression have a bidirectional association. In the broadest sense, cancer survivor women, who have depression due to cancer itself or chemotherapeutic agents, could develop sexual dysfunction, whereas patients, who develop sexual dysfunction during and after chemotherapy, may have symptoms of depression (68).

A prospective study conducted on women with breast cancer reported that from the prechemotherapy stage to the post-chemotherapy one, fatigue was significantly increased in patients with cancer. It has been suggested that fatigue can significantly disturb sexual satisfaction in women with cancer (69). Fatigue disturbs daily activities and may lead to an unwillingness to start sexual activity. Several mechanisms have been proposed to explain cancer-related fatigue in patients with cancer (70). One possible mechanism explains that an increased level of pro-inflammatory cytokines contributes to fatigue development, reduced activity, anorexia, and social withdrawal. In addition to the biological mechanism involved in the development of fatigue, studies have reported that patients with cancer who are anxious and/or depressed develop symptoms of fatigue more than patients who do not experience psychological distress (71). In conclusion, it can be implied that there is a direct association between depression or anxiety and cancer-related fatigue.

An important aspect that should be considered is the timing of an increased risk of psychological issues. Studies have shown that depression appears to be high during the acute phase of cancer and reduces following treatment, but it depends on the prognosis and cancer type (72). It should be regarded that the negative impacts of depression would exacerbate the already distressing process of

chemotherapy (73). In addition to the above-mentioned cases, individual risk factors (demographic factors, including age and sex), social-economic variables (including unemployment, lower literacy level, and lack of social support), and the structural level (including healthcare costs and access to welfare support) can increase the risk of depression (74-76). Moreover, partners could support patients by the following items: (1) Supporting their spouse in their daily lives, (2) Accompanying them during cancer therapy and examinations, and (3) Being more responsible for their home and children compared to before. A growing body of evidence has reported that partners themselves usually experience higher levels of stress than patients with cancer, and there is a significant concordance between the distress levels of the patients and their partner (3). However, this point must be considered that the psychological impact of cancer could not always be regarded as negative, and many patients would not experience psychological issues, such as depression and anxiety. Experiencing distress associated with the diagnosis and treatment of cancer may lead to positive psychological changes and could cause patients to feel more appreciated about their life and to reevaluate their life priorities (77).

Cognitive-based behavioral therapy (CBT) can be used for cancer survivors as an adjunct to the typical treatment for mental disorders. CBT is a psychological intervention and has been demonstrated to have significant effects on mental health improvement. CBT is a non-invasive therapeutic intervention that helps patients to focus on thinking patterns and recognize negative thoughts and feelings (34, 78). According to a meta-analysis study, within or after a 4-month follow-up period, patients with breast cancer who received CBT had significant improvements in anxiety but not in depression and quality of life compared to patients who did not receive CBT (79). Based on a randomized clinical trial, internet-based CBT intervention could improve sexual function, body image, and menopausal symptoms in patients with breast cancer who have sexual dysfunction (80). Behavioral activation (BA) is one of the most important CBT skills that have beneficial effects on patients with cancer. BA helps patients to trigger their sources of reinforcement and to encourage them to maintain proper behavioral patterns. A study conducted on patients with lung and breast cancer suggested that BA was an effective intervention to improve emotional disorders, including depression in patients (81). A recent study evaluated the effectiveness of music therapy (MT) and virtual reality (VR), which could significantly alleviate patients' anxiety and improve their emotional state during chemotherapy. Virtual reality is an immersive and 3-dimensional tool helping people to distract their minds and alleviate their pain and distress during medical procedures like chemotherapy (82).

3.6. Sexual Management

Sexual issues are among the most common and distressing quality sequelae of cancer therapy that have a considerable negative impact on patients' quality of life and well-being (83, 84). These include physiological sexual dysfunction, emotional or motivational issues, and interpersonal changes (83). Sexual concerns can negatively impact patients' psychological health, relationship adjustment, and overall quality of life (85). According to one study, psychological issues could affect patients during cancer therapy and also follow-up. Psychological problems could persist for years after cancer treatment, resulting in psychological distress and could significantly disrupt cancer patients' well-being and life quality. It has been reported that anxiety, depression, fear, and cognitive disorders are common in long-term cancer survivors (86). Inconsistently, some other studies have indicated that mental health and quality of life in this population are not significantly affected (87). According to several studies, frank conversations about sexual health issues do not usually occur between patients and their practitioners after cancer treatment (88). However, cancer survivors are willing to address cancer-related sexual issues with their practitioners (89). A large number of female cancer survivors do not communicate with their medical team about the consequences of their cancer treatment. Based on studies, there are various barriers prohibiting appropriate conversation between patients and practitioners about sexual issues following cancer treatment (90). One study showed that 41% of patients requested their oncologist to ask about sexual health and 58% of patients requested their primary care providers (PCPs) to ask about sexual health. Over 90% of patients reported that their oncologist infrequently asked about sexual health issues, and their oncologist was unwilling to initiate such a conversation. Several factors have been reported to influence whether patients request their oncologist to ask about sexual issues. Factors include age, level of education, and insurance type were among the most influential factors. However, levels of depression, anxiety, and sexual satisfaction were not associated with communication preferences (91). Finding an appropriate language to communicate about sexual issues and decipher patients' comments appears to be hard and challenging in the lack of appropriate training and confidence (92). Furthermore, patients/survivors are also unwilling to initiate this discussion (93). From patients' perspective, barriers to initiating the discussion with their practitioners include unwillingness their doctor to feel uncomfortable, belief that it is the practitioner responsibility to discuss about concerns, and thinking that sexual issues would

not be regarded as a critical issue. These mutual barriers often result in an improper discussion in the consulting room. In addition, this condition could also lead to decreased perceived self-esteem and confidence for patients with cancer regarding how to address their sexual concerns (94). The conversation could include the patient's partner, only with the patient's agreement. There are some effective methods for helping clinicians to initiate a better conversation with patients (95). The 5A's model (Ask, Advise, Assess, Assist, and Arrange Follow-up) is useful for discussing sexual health issues in medical settings extending the well-known PLISSIT model (96). This model stands for the 4 intervention levels – Permission, Limited Information, Specific Suggestions, and Intensive Care designed for any health professional to improve sexual dysfunction complaints and sexual issues in female cancer survivors (96).

According to the ASCO (American Society of Clinical Oncology) Qualifying Statement, the discussion about sexual issues should be introduced with the patient alone. However, the patient's partner could be included if desired by the patient. Discussions should be congruent with the patient's education level, cultural and religious beliefs, and sexual orientation (95). Moreover, brief and effective patient resources, including simple clinical checklists and appropriate educational materials could be used to improve female cancer patients' sexual function. Practitioners need appropriate guidance on what type of questions should be asked and how to better initiate discussion about sexual issues with their patients (90). Oncology care team should also pay attention to patients' physical examination in addition to their mental health during and after the treatment. The patient should be informed of appropriate health screenings during and after therapy and be aware of all the advantages and disadvantages of treatment. Moreover, oncology care team should inform the patient about potential short-term and long-term side effects of cancer treatment like the possibility of sexual function issues.

After completion of cancer treatment, focused constitutional assessment and identifying prominent signs such as the risk for developing should be included in the physical examination of the female cancer patients with sexual dysfunction (97). Moreover, some chemotherapeutic regimens could lead to transient or persistent elevated blood pressure and increased risk for cardiovascular disease; therefore, clinicians should screen female cancer survivors' cardiovascular system (98). In addition, in some types of cancers like breast cancer, altered levels of androgens could contribute to cancer development and increase the risk of coronary artery disease in these patients (99). Hence, accurate monitoring of cardiovascular diseases should be performed in female cancer survivors. Chemotherapy also influences internal and external genital systems; therefore, an examiner skilled practitioner should examine genito-pelvic areas. The examination includes inguinal lymph node palpation and analysis of the external genitalia, such as the mons pubis, labia majora and minora, clitoris, perineum, vestibule, vaginal introitus, urethral meatus, and urethra. Bilateral oophorectomy and the gonadotoxic is affected of chemotherapy can induce hypoestrogenism, a condition resulting in alterations in the anatomy and physiology of the genitalia (100).

4. Conclusions

In conclusion, chemotherapy is one of the most common cancer treatments affecting sexual health aspects, such as decreased libido, arousal and orgasm, dyspareunia, dysfunction of the sexual response cycle before puberty, and vulvovaginal atrophy. However, many patients are reluctant to discuss their sexual problems. Accordingly, increased awareness about the diagnosis and treatment of these problems is needed. In this study, we focused on the effect of chemotherapy on sexual health, such as ovarian function, vaginal atrophy, dyspareunia, and sexual desire requiring the coordination of oncologists, gynecologists, and primary care physicians to diagnose and treat them.

Footnotes

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