

Risk Factors for Sexual Dysfunction in Obese Women

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Abstract: Obesity is a modern disease that may be associated with sexual dysfunction, the inability to participate in a pleasurable sexual relationship. Sexual dysfunction is more common in women than men. The objective of this study was to investigate risk factors for sexual dysfunction in obese women. Articles in English and Portuguese published between 1996 and 2018 in the Medline/PubMed and SciELO databases were identified using the terms "sexuality" AND "sexual dysfunction" AND "obesity" AND "overweight" AND "body mass index" AND "women". The results showed that female sexual dysfunction, a complex multifactorial disease that is correlated to health status, can be influenced by obesity. Thus, it can be concluded that weight loss, lifestyle changes and a healthy diet, treatment of complications associated with obesity, and use of non-hormonal contraceptives can lead to an improvement in female sexual function and, consequently, the quality of life of women.

Keywords: Sexual Activity, Obesity, Sexuality, Body Mass Index, Women

Introduction

Sexual dysfunction is defined as the presence of changes in one or more response phases of sexual intercourse and/or associated pain, resulting in impairment of the experience of pleasure and performance.¹⁻³ In female sexual dysfunction, the characteristics of the menstrual cycle and stages of the life cycle such as menarche, pregnancy, lactation, menopause and senility modify and are modified by sexual activity.^{1,2,4}

Changes in sexual quality of life are associated with eating disorders, increased body mass index (BMI) and consequently obesity.⁵⁻⁷ Studies suggest that obese women tend to have higher levels of inactivity and sexual dysfunction than obese men.⁸ Thus, obesity can impair the female sex life due to lack of orgasm, reduced sexual desire and performance difficulties.⁵⁻⁷

Obesity is associated with the risk of mortality and is a serious public health problem.^{9,10} According to the World Health Organization (WHO), it is estimated that more than 1.9 billion adults were overweight worldwide in 2016, of which 650 million are obese.¹¹ Of the etiological agents of obesity, genetic, environmental and individual factors are of note, as are psychosocial and hormonal aspects.^{12,13}

Considering the multidisciplinary approach to obesity and female sexual dysfunction, studies contribute to improve to the quality of life of women.^{1,14,15}

Given this context, considering the impact of both sexual dysfunction and obesity, it is important to study risk factors for sexual dysfunction in obese women, since excess weight may contribute to the

appearance or worsening of female sexual dysfunction. The objective of this study was to investigate risk factors for sexual dysfunction in obese women by means of a literature review.

Methods

Articles in English and Portuguese published between 1996 and 2018 in the Medline/PubMed and SciELO databases were identified using the terms "sexuality" AND "sexual dysfunction" AND "obesity" AND "overweight" AND "body mass index" AND "women" in both English and Portuguese. Original articles, systematic reviews and meta-analysis were considered. Studies that did not address the association between obesity and female sexual dysfunction were excluded.

Epidemiology

Research conducted by the Reference and Specialization Center in Sexology (Cresex) of the Health Department of the state of São Paulo showed that a lack or decrease in sexual desire affects 48.5% of women.¹⁶ Of the factors investigated, difficulty in achieving an orgasm was reported by 18.2% of the patients, 9.2% had dyspareunia and 6.9% felt sexual inadequacy (different levels of desire compared to their partners). In relation to predominantly organic causes, 13% of the patients had hormonal changes or problems due to some disease.¹⁶

Of note, studies with Brazilian women show that female obesity and excess weight may be related to sexual dysfunction.¹⁷⁻¹⁹ This evidence is in agreement with a study by Silva et al.¹⁹ who found that 73.9% of women with sexual dysfunction were obese; lacking desire and excitement were the most frequent complaints.¹⁹ Of the patients at increased risk for

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sexual dysfunction, all had at least one risk factor with dyslipidemia and systemic arterial hypertension being the most common.

Research conducted in recent decades shows that obesity will reach 20% of the Brazilian population in 2025, 40% in the United States and 30% in England.² The worldwide prevalence of obesity has doubled since 1980 and in 2014 more than 13% of adults were obese.²⁰ Around the globe, the estimated prevalence of age-related obesity in 2014 was 10.8% among adult males and 14.9% among adult females.²¹⁻²³ These data indicate that women are at a higher risk of obesity, while being overweight is more prevalent among men.²¹

Obesity contributes to the development of diabetes mellitus, cardiovascular disease and cancer, in addition to causing significant economic costs to the healthcare system.⁸ Regarding cancer, obese women are at higher risk of developing endometrial cancer, so as the prevalence of obesity continues to increase, it becomes important to investigate the eating habits of women in order to improve female sexual dysfunction.²⁴

Etiology

Sexual quality of life is multifactorial and includes arousal, desire, satisfaction, physical functioning, beliefs and values, comfort with sexual intimacy, emotions, body image and self-esteem.^{5,10,25} In women, sexual dysfunction is defined as a persistent or recurrent decrease in sexual desire and sexual arousal, dyspareunia and difficulty or inability to reach orgasm.²⁶

Sexuality is an important aspect of quality of life and a growing body of evidence suggests that female obesity negatively affects sexuality in both men and women and may lead to sexual dysfunction.⁸

Obesity, with a multifactorial etiology, is one of the contributing factor of sexual dysfunction. Obesity is widely considered to be a result of the imbalance between energy intake and expenditure that may result from low physical activity (sedentary lifestyle) and excessive consumption of high energy foods above the individual's needs.^{12,27}

Obesity is associated with changes in the endocrine system involving hormonal levels resulting from changes in the secretion pattern and/or altered metabolism and transport.¹³ The hormones oxytocin, progesterone, and prolactin may be associated with female sexual dysfunction along with obesity and metabolic syndrome.⁷

Studies indicate that obesity can lead to worsening sexual functioning and it can also be observed that worsening of sexual functioning can lead to obesity due to reduced physical activity or increased food intake.²⁸ In addition, psychiatric, psychological or physiological/hormonal disorders that lead to weight gain and worsening sexual functioning cannot be discarded.²⁸

Risk factors

Different influences, both physical and psychological, affect sexual health.⁸ Sexual dysfunction is worse in obese women than in obese men, in whom erectile dysfunction is common and improvement in sexual function usually occurs with weight loss. Clinical studies show more problems in women related to their weight, while population studies show a tendency of more sexual difficulties among men in relation to obesity.²⁸ However, not all obese individuals have sexual dysfunction or inactivity.⁸

In the last decade, research has associated different neurological diseases and pain syndromes with the increased risk of female sexual dysfunction. One example, the relationship between migraine and female sexual dysfunction, has recently been studied but is not well understood yet.²⁹⁻³¹ Bond et al.³² found that being overweight or obese is associated with increased anxiety and increased risk of female sexual dysfunction.

Low self-esteem and self-acceptance, negative body image, difficulties with relationships and other factors that negatively affect sexuality are observed in obese women.^{8,33} Furthermore, female sexual dysfunction is observed in women with other risk factors such as diabetes, cardiovascular disease, hypertension, metabolic syndrome and polycystic ovary syndrome.^{26,34}

Considering diabetes mellitus as a risk factor for sexual dysfunction, AlMogbel et al.³⁵ investigated the prevalence of sexual dysfunction in women with type 2 diabetes mellitus to determine whether age, glycemic control and obesity are associated with female sexual dysfunction. In this study, obesity was linked with a slight increase in sexual dysfunction; the prevalence of dysfunction among women with type 2 diabetes was high (88.7%) and increased with age (92% in the over 50-year-old age group).³⁵ However, hyperglycemia was the main determinant of vascular diabetic complications and participated in pathogenic mechanisms of sexual dysfunction in diabetics.³⁵

Cardiovascular disease shares several risk factors with sexual dysfunction, and there is evidence of common pathophysiologies such as atherosclerosis, endothelial dysfunction and subclinical inflammation.²⁶ Moreover, cardiovascular disease is the leading cause of death in postmenopausal women, since weight gain contributes to other diseases, including cancer, arthritis, mood disorders and sexual dysfunction. Thus, increased central body fat, particularly visceral fat, is associated with adverse metabolic consequences and increased risk of cardiovascular disease.³⁶

The use of antihypertensive drugs in women was correlated to sexual dysfunction.²⁶ In 200 hypertensive women, the prevalence of female sexual dysfunction was greater in those who used medications for hypertension.³⁷

The early identification of cardiovascular disease

could contribute to modify other risk factors and potentially reduce the risk of adverse effects of this disease. The implementation of lifestyle modifications in patients with sexual dysfunction could provide benefits related to cardiovascular disease with potential improvements in sexual activity.²⁶

With regard to lifestyle changes, the results of studies on the effect of the Mediterranean diet in men and women with metabolic syndrome showed improvements in sexual function for both sexes.²⁶ Women with metabolic syndrome with elevated triglycerides had a two-fold higher risk of developing sexual dysfunction compared to the female population in general.³⁸

In addition to metabolic syndrome, hormonal changes are also related to female sexual dysfunction. Endocrine aspects of sexual function are complex and are related to the estrogen and androgen sex hormones, however the effects are not yet clear.⁷ Considering the hormone prolactin, treatment of hyperprolactinemia elicited a decrease in female sexual dysfunction.⁷

Polycystic ovarian syndrome is a combination of anovulation, obesity and hyperandrogenism that can affect the sexual function of women of reproductive age, as well as being associated with endometrial cancer.³⁹⁻⁴¹

Diagnosis

The diagnosis of female sexual dysfunction is made when symptomatic and, when the disease is untreated, it tends to evolve intensively and chronically, and may have repercussions on general relationships with the partner, self-image, work, family and social relationships.¹

The evaluation of female sexual dysfunction can be performed through the Female Sexual Quotient questionnaire (F-SQQ), which was created in English by Fairbanks et al. and translated and adapted to Portuguese by Abdo.⁴² The F-SQQ consists of ten questions that assess the main domains of sexual function: desire, excitement, orgasm, comfort, and sexual satisfaction. Each question is scored from 0 to 5 with higher scores indicating a better function except for question 7 [pain during intercourse] in which the inverse is true, so the score for question 7 is subtracted, instead of being added to the overall score. Scores of individual questions are multiplied by two and so the maximum possible total score therefore ranges from 0 to 100. In the interpretation of the total score, sexual performance is categorized as follows: absent to low (0-20 points), low to unfavorable (22-40 points), unfavorable to reasonable (42-60 points), reasonable to good (62-80 points) and good to excellent (82-100 points). In addition, the main type of disorder presented by the patient can be diagnosed through an evaluation of individual scores by domain (question or group of questions): decreased desire and sexual interest (unfavorable scores in questions 1, 2 and 8); dysfunction in the various phases of excitation (unfavorable scores in questions 3, 4, 5 and 6); presence of dyspareunia

(unfavorable score in question 7); and orgasmic dysfunction (unfavorable scores in questions 9 and 10). For question 7, a score of 4 or 5 is considered unfavorable, while a score of 0 or 2 is considered unfavorable for all the other questions.^{42,43}

Among other factors, obesity has been the cause of female sexual dysfunction most discussed in the literature. Thus, it is important to evaluate the degree of excess weight and especially obesity in patients with female sexual dysfunction. The World Health Organization (WHO) classification of excessive weight is based on BMI.⁴⁴ This index is defined as weight in kilograms divided by the square of the height in meters (kg/m^2). For example, an adult who weighs 70 kg and whose height is 1.75 m has a BMI of $22.9 \text{ kg}/\text{m}^2$ [calculation: $\text{BMI} = 70 \text{ kg}/(1.75 \text{ m})^2 = 70/3.06 = 22.9$].⁴⁴ Overweight is defined as a BMI between 25 and $29 \text{ kg}/\text{m}^2$ and obese is $\geq 30 \text{ kg}/\text{m}^2$.

The BMI is independent of age and sex. However, BMI may not correspond to the same degree of fat in different populations due, in part, to different body proportions. Health risks associated with increased BMI are continuous and the interpretation of BMI in relation to risk may vary for different populations.⁴⁴ Data from the literature show that postmenopausal obese women present a higher risk of overall mortality. Furthermore, deaths due to cardiovascular diseases are four times higher in women with a BMI greater than $29 \text{ kg}/\text{m}^2$ compared to women with a lower BMI.³⁶

Clinical condition

Female sexual dysfunction is a disease consisting of several complex symptoms. The association between sexual symptoms, emotional and physical satisfaction with sexual partners, and feelings of general happiness is much more evident in women than in men. Although the reporting of one sexual symptom does not necessarily qualify as female sexual dysfunction, this dysfunction affects from 40-50% of women, regardless of age, with various differences around the world.⁴⁵

In women, both sexual motivation and performance are influenced by sex hormones. Menopause is the most studied condition in the context of female sexual dysfunction from the organic point of view due to hormonal deprivation, since hormones boost the menstrual cycle and the extent of fertility is important in women's motivation to engage in sexual activity, both mentally and physically.⁴⁵ The significant decrease in levels of circulating estrogen with natural menopause, the decline of androgens with age and possible surgical menopause contribute to a different degree of sexual symptoms such as low desire, low arousal, dyspareunia, unsatisfactory orgasm and reduced satisfaction.⁴⁵

On the other hand, menopause interferes in emotional and cognitive aspects of sexuality through changes in circulating sex hormones; however, the personal history of the woman should be considered individually as it also contributes to sexual function. The most relevant variables are age, physical and mental health, attainment of reproductive goals,

education, body image, self-esteem, norms and experiences. Furthermore, the duration, quality of partnership, general and sexual health of the partner are also important.^{46,47}

Treatment

To treat female sexual dysfunction one should consider changes in lifestyle that contribute to the development of the dysfunction. The present study will focus on weight-loss programs associated with diet, treatment of cardiovascular diseases with the use of antihypertensive drugs and intrauterine devices (IUDs) to replace the use of contraceptive medication.^{8,26,48}

Due to the relationship between obesity and decreased sexual function, it is suggested that weight loss may have positive effects on sexual functioning. Thus, lifestyle modifications such as dietary restrictions, increased weekly physical exercise, and glycemic control were proposed as ways to reduce the likelihood of developing sexual dysfunction.^{35,48}

Weight loss can improve sexual response as it may have positive biochemical effects resulting from decreased adipose tissue, improve general health and moderate deleterious effects of comorbidities such as cardiovascular disease, diabetes and metabolic syndrome. Alternatively, it can affect psychological parameters such as self-esteem, confidence, body image, depression and anxiety, leading to greater sexual interest, more positive affection towards sex and increased sexual desire.⁴⁸

Since endothelial distension and dyslipidemia are associated with an accumulation of visceral adipose tissue in men and women, weight loss and other lifestyle changes can presumably improve hemodynamics and restore compromised vaginal endothelial function in women.⁴⁸

Thus, dietary treatments and their effects on sexual function in women have been studied.⁴⁸ Weight loss has proven possible with good results achieved by people who adhere to low-carbohydrate or low-fat diets and different weight loss programs.⁴⁹

According to the guidelines for the management of overweight and obesity in adults,⁵⁰ all adults should be screened for excess weight (overweight or obesity) and for those with a BMI of 30 kg/m² or more, intensive interventions should be offered to address diet and physical exercise.⁸

In a study conducted with 24 women, the benefits of weight loss were demonstrated through interventions such as group meetings with discussion about diet, calorie-conscious consumption, medication for weight loss, and increased physical activity.²⁸ Findings from this study showed that group treatment and the reduction in BMI of these women were associated with improvements in arousal and orgasm.²⁸

An investigation of the effects of an intensive diet program based on restricted diet and exercise in 44 obese women showed that they showed significant

improvements in arousal, lubrication and sexual satisfaction with weight loss.²⁵ Furthermore, levels of cholesterol, triglycerides and insulin improved after 16 weeks.

It is important to emphasize that patients should consult a nutritionist to create an individualized diet plan that meets their needs, preferences and lifestyle. Patients should also be encouraged to use weight management tools such as calorie counting applications (MyFitnessPal, Lose It!) and online resources (National Weight Control Registry).³⁶

Several drugs may influence hypoactive desire, arousal and difficulty achieving an orgasm such as antihypertensive agents, selective serotonin reuptake inhibitors, and chemotherapeutic agents.⁵¹ Antihypertensive drugs, diuretics and beta-blockers appear to have a detrimental impact on sexual function with nebivolol being the only beta-blocker with favorable properties through increased nitric oxide bioavailability.⁵¹

An association between hypertension and female sexual dysfunction has not yet been elucidated.⁵²⁻⁵⁴ However, antihypertensive drugs act by relaxing the smooth muscle of the tunica media in the blood vessel, resulting in vasodilation with increased blood flow to the vaginal tissues; arousal is also due to smooth muscle relaxation.⁵⁵ In a study with antihypertensive drugs, women taking this type of medication reported increased sexual dysfunction compared to women who did not use this medication.⁵⁶

Another form of treatment of female sexual dysfunction is the use of non-hormonal contraceptives as several contraceptive methods have been associated with changes in sexual function. Of the contraceptive methods, long-term reversible contraception, including levonorgestrel, copper intrauterine contraception and etonogestrel, were more widely accepted by women throughout their reproductive life for their safety, efficacy and convenience.^{56,57}

Combined oral hormonal contraception was associated with decreased lubrication, arousal, sexual pleasure and frequency of orgasm, and increased sexual pain.⁵⁶ This association may be related to decreased levels of circulating androgen due to increased sex hormonal binding globulin (SHBG) and decreased free testosterone together with suppressed production of ovary androgen. The anti-androgenic effect can be amplified with hormonal contraception containing anti-androgenic progestin.⁵⁶

Regarding the IUD, a study in Turkey showed a positive correlation in the improvement of sexual function in women with long-term use of the copper coil.⁵⁸ However, Sakinci et al. found that women who used the copper IUD had more sexual pain compared to women who did not use the coil, so the copper IUD may have resulted in decreased sexual arousal, lubrication, and orgasm in these women.⁵⁹

Conclusions

Female sexual dysfunction is a multifactorial disease whose complexity involves physical, hormonal, emotional and mental health conditions. Obesity and associated complications may contribute to the onset and/or worsening of sexual dysfunction in women. Thus, programs of weight loss, healthy eating, treatment of the complications associated with obesity and use of non-hormonal contraceptives can lead to an improvement in the female sexual function and, consequently, the quality of life of women.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

References

1. Abdo CHN; Lopes GP. Disfunção sexual feminina: Diagnóstico e tratamento. In: *Workshop de Sexualidade: Diagnóstico e tratamento em disfunção sexual*. 3th chapter. São Paulo: Segmento Farma. 2012:37- 66.
2. Jorge LB, Poltronieri D, Zanella AK, Bós AJG, Latorre GS. Impact of overweight in sexual dysfunction female: review of literature. *Femina* 2015;43(6):265-271.
3. Simoncig Netjasov A, Tančić-Gajić M, Ivović M, Marina L, Arizanović Z, Vujović S. Influence of obesity and hormone disturbances on sexuality of women in the menopause. *Gynecol Endocrinol*. 2016;32(9):762-766.
4. Ribeiro MC, Nakamura MU, Torloni MR, et al. Maternal overweight and sexual function in pregnancy. *Acta Obstet Gynecol Scand*. 2016;95(1):45-51.
5. Kolotkin RL, Binks M, Crosby RD, Østbye T, Gress RE, Adams TD. Obesity and Sexual Quality of Life. *Obesity*. 2006;14:3.
6. Morotti E, Battaglia B, Paradisi R, et al. Body mass index, Stunkard Figure Rating Scale, and sexuality in young Italian women: a pilot study. *J Sex Med*. 2013;10(4):1034-43.
7. Worsley R, Santoro N, Miller KK, Parish SJ, Davis SR. Hormones and Female Sexual Dysfunction: Beyond Estrogens and Androgens--Findings from the Fourth International Consultation on Sexual Medicine. *J Sex Med*. 2016;13(3):283-90.
8. Katz A. Obesity and Sexual Dysfunction: Making the Connection. *Am J Nurs*. 2017;117(10):45-50.
9. Fontaine KR, Barofsky I. Obesity and health-related quality of life. *Obes Rev*. 2001;2:173-82.
10. Costa RF, Machado SC, Cordás TA. Imagem corporal e comportamento sexual de mulheres obesas com e sem transtorno da compulsão alimentar periódica. *Rev Psiq Clín*. 2010;37(1):27-31.
11. World Health Organization (WHO). Obesity and overweight. WHO web site. <http://www.who.int/mediacentre/factsheets/fs311/en/> Published October 18, 2017. Accessed February 21, 2018.
12. Smith HÁ, Markovic N, Danielson ME, et al. Sexual Abuse, Sexual Orientation, and Obesity in Women. *J Womens Health* 2010;19(8): 1525-1532.
13. Pinkney JH, Kopelman PG. Endocrine determinants of obesity. In Bray GA, Bouchard C eds, *Handbook of Obesity. Etiology and Pathophysiology*. 2nd ed. New York, NY: Marcel Dekker. 2004;655-670.
14. Mayer ME, Bauer RM, Schorsch I, Sonnenberg JE, Stief CG, Uckert S. Female sexual dysfunction: what's new? *Curr Opin Obstet Gynecol* 2007;19(6):536-540.
15. Mendonça CR, Silva TM, Arrudai JT, Zapata MTAG, Amaral WN. Female sexual function: normal and pathological aspects, prevalence in Brazil, diagnosis and treatment. *Femina* 2012;40(4):195-202.
16. Do Portal do Governo do estado de São Paulo web site. <http://www.saopaulo.sp.gov.br/sala-de-imprensa/release/falta-de-desejo-sexual-e-queixa-de-48-das-mulheres-atendidas-em-servico-do-perola-byington/>

17. Ribeiro MC, Nakamura MU, Torloni MR, Scanavino Mde T, Scomparini FB, Mattar R. Female sexual function of overweight women with gestational diabetes mellitus - a cross-sectional study. *PLoS One* 2014;9:e95094.
18. Zueff LN, Lara LA, Vieira CS, Martins Wde P, Ferriani R. Body composition characteristics predict sexual functioning in obese women with or without PCOS. *Journal of Sex & Marital Therapy* 2015;41:227-237.
19. Martins e Silva B, TCBC-AL, Rêgo LM, Galvão MA, Florêncio TMMT, Cavalcante JC. Incidence of sexual dysfunction in patients with obesity and overweight. *Rev Col Bras Cir*. 2013;40(3):196-202.
20. Escobar-Morreale HF, Santacruz E, Luque-Ramírez M, Botella Carretero JI. Prevalence of 'obesity-associated gonadal dysfunction' in severely obese men and women and its resolution after bariatric surgery: a systematic review and meta-analysis. *Hum Reprod Update*. 2017;23(4):390-408.
21. NCD Risk Factor Collaboration (NCD-RisC). Trends in adult body-mass index in 200 countries from 1975 to 2014: a pooled analysis of 1698 population-based measurement studies with 19.2 million participants. *Lancet* 2016;387:1377-1396.
22. Lauby-Secretan B, Scoccianti C, Loomis D, Grosse Y, Bianchini F, Straif K; International Agency for Research on Cancer Handbook Working Group. Body fatness and cancer - viewpoint of the IARC Working Group. *N Engl J Med*. 2016;375:794-798.
23. Ng M, Fleming T, Robinson M, et al. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 2014;384:766-781.
24. Kimmel MC, Ferguson EH, Zerwas S, Bulik CM, Meltzer-Brody S. Obstetric and gynecologic problems associated with eating disorders. *Int J Eat Disord*. 2016;49(3):260-75.
25. Aversa A, Bruzziches R, Francomano D, et al. Weight loss by multidisciplinary intervention improves endothelial and sexual function in obese fertile women. *J Sex Med*. 2013;10(4):1024-33.
26. Imprialos KP, Stavropoulos K, Doumas M, Tziomalos K, Karagiannis A, Athyros VG. Sexual Dysfunction, Cardiovascular Risk and Effects of Pharmacotherapy. *Curr Vasc Pharmacol*. 2018;16(2):130-142.
27. González-Muniesa P, Martínez-González MA, Hu FB, et al. Obesity. *Nat Rev Dis Primers*. 2017;3:17034.
28. Kolotkin RL, Zunker C, Østbye T. Sexual functioning and obesity: a review. *Obesity (Silver Spring)*. 2012;20(12):2325-33.
29. Li F, Wang Y, Xiao L, Lou Q, Fish AF. Frequency, severity, and risk factors related to sexual dysfunction in Chinese women with T2D. *J Diabetes*. 2016;8:544-551.
30. Liu L, Kang R, Zhao S, et al. Sexual dysfunction in patients with obstructive sleep apnea: A systematic review and meta-analysis. *J Sex Med*. 2015;12:1992-2003.
31. Abdollahi M, Toghae M, Raisi F, Saffari E. The prevalence of female sexual dysfunction among migraine patients. *Iran J Neurol*. 2015;14:8-11.
32. Bond DS, Pavlović JM, Lipton RB, et al. Sexual Dysfunction in Women With Migraine and Overweight/Obesity: Relative Frequency and Association With Migraine Severity. *Headache*. 2017;57(3):417-427.
33. Shah MB. Obesity and sexuality in women. *Obstet Gynecol Clin North Am*. 2009;36(2):347-60, ix.
34. Noroozadeh M, Ramezani Tehrani F, Bahri Khomami M, Azizi F. A Comparison of Sexual Function in Women with Polycystic Ovary Syndrome (PCOS) Whose Mothers Had PCOS During Their Pregnancy Period with Those Without PCOS. *Arch Sex Behav*. 2017;46(7):2033-2042.
35. AlMogbel TA, Amin HS, AlSaad SM, AlMigbal TH. Prevalence of sexual dysfunction in saudi women with Type 2 diabetes: Is it affected by age, glycemic control or obesity? *Pak J Med Sci*. 2017;33(3):732-737.
36. Kapoor E, Collazo-Clavell ML, Faubion SS. Weight Gain in Women at Midlife: A Concise Review of the

- Pathophysiology and Strategies for Management. *Mayo Clin Proc.* 2017;92(10):1552-1558.
37. Doumas M, Tsiodras S, Tsakiris A, et al. Female sexual dysfunction in essential hypertension: A common problem being uncovered. *J Hypertens* 2006;24:2387-92.
 38. Martelli V, Valisella S, Moscatiello S, et al. Prevalence of sexual dysfunction among postmenopausal women with and without metabolic syndrome. *J Sex Med* 2012;9:434.
 39. Esch T, Stefano GB. The Neurobiology of Love. *Neuro Endocrinol Lett.* 2005;26(3):175-92.
 40. Dasthi S, Latiff LA, Hamid HA, et al. Sexual Dysfunction in Patients with Polycystic Ovary Syndrome in Malaysia. *Asian Pac J Cancer Prev.* 2016;17(8):3747-51.
 41. Eftekhar T, Sohrabvand F, Zabandan N, Shariat M, Haghollahi F, Ghahghaei-Nezamabadi A. Sexual dysfunction in patients with polycystic ovary syndrome and its affected domains. *Iran J Reprod Med.* 2014;12(8):539-46.
 42. Abdo CHN. Quociente sexual feminino: um questionário brasileiro para avaliar a atividade sexual da mulher. *Diagn Tratamento.* 2009;14(2):89-91.
 43. Fairbanks F, Andres MP, Caldeira P, Abdo C, Podgaec S. Sexual function, anxiety and depression in women with benign breast disease. A case-control study. *Rev Assoc Med Bras* (1992). 2017;63(10):876-882.
 44. World Health Organization. BMI classification: table 1: the international classification of adult underweight, overweight and obesity according to BMI. http://apps.who.int/bmi/index.jsp?introPage=intro_3.html. Accessed October 8, 2017.
 45. Nappi RE, Cucinella L, Martella S, Rossi M, Tiranini L, Martini E. Female sexual dysfunction (FSD): Prevalence and impact on quality of life (QoL). *Maturitas.* 2016;94:87-91.
 46. McCabe MP, Sharlip ID, Lewis R, et al. Risk Factors for Sexual Dysfunction Among Women and Men: A Consensus Statement From the Fourth International Consultation on Sexual Medicine 2015. *J Sex Med* 2016;13:153-67.
 47. Hatzichristou D, Kirana PS, Banner L, et al. Diagnosing Sexual Dysfunction in Men and Women: Sexual History Taking and the Role of Symptom Scales and Questionnaires. *J Sex Med* 2016;13:1166-82.
 48. Rowland DL, McNabney SM, Mann AR. Sexual Function, Obesity, and Weight Loss in Men and Women. *Sex Med Rev.* 2017;5(3):323-338.
 49. Johnston BC, Kanters S, Bandayrel K, et al. Comparison of weight loss among named diet programs in overweight and obese adults: a meta-analysis. *JAMA* 2014;312(9):923-33.
 50. Ryan D, Heaner M. Guidelines (2013) for managing overweight and obesity in adults: preface to the full report. *Obesity* (Silver Spring) 2014;22 Suppl 2:S1-S3.
 51. Camps MA, Zervos E, Goode S, Rosemurgy AS. Impact of Bariatric Surgery on Body Image Perception and Sexuality in Morbidly Obese Patients and their Partners. *Obes Surg* 1996;6:356-360.
 52. Wingfield LR, Kulendran M, Laws G, Chahal H, Scholtz S, Purkayastha S. Change in sexual dysfunction following bariatric surgery. *Obes Surg* 2016;26: 387-394.
 53. Steffen KJ, King WC, White GE, et al. Sexual functioning of men and women with severe obesity before bariatric surgery. *Surg Obes Relat Dis.* 2017;13(2):334-343.
 54. Goitein D, Zendel A, Segev L, Feigin A, Zippel D. Bariatric surgery improves sexual function in obese patients. *Isr Med Assoc J* 2015;17(10):616-9.
 55. Giraldi A, Marson L, Nappi R, et al. Physiology of female sexual function: animal models. *J Sex Med.* 2004;1(3):237-53.
 56. Casey PM, MacLaughlin KL, Faubion SS. Impact of Contraception on Female Sexual Function. *J Womens Health* (Larchmt). 2017;26(3):207-213.
 57. Batur P, Bowersox N, McNamara M. Contraception: Efficacy, Risks, Continuation Rates, and Use in High-Risk Women. *J Womens Health* (Larchmt). 2016;25(8):853-6.
 58. Koseoglu SB, Deveer R, Akin MN, Gurbuz AS, Kasap B, Guvey H. Is There Any Impact of Copper Intrauterine Device on Female Sexual Functioning? *J Clin Diagn Res.* 2016;10(10):QC21-QC23.
 59. Sakinci M, Ercan CM, Olgan S, Coksuer H, Karasahin KE, Kuru O. Comparative analysis of copper intrauterine device impact on female sexual dysfunction subtypes. *Taiwan J Obstet Gynecol.* 2016;55(1):30-4.