

Investigating the Relationships Between Obesity and Sexual Function and Its Components

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Abstract

Background: Proper sexual function is an important factor that affects family strength. Recently, the issue of obesity and the influence of body mass index (BMI) on sexual function have received increasing research attention.

Objectives: This study aimed to investigate the relationship between sexual function and its domains with obesity and central obesity.

Methods: This cross-sectional study was conducted on 514 women aged 15 - 45 years who presented at Shiraz healthcare centers in 2014 - 2015. Simple random sampling was performed. Data were collected by applying the female sexual function index (FSFI), weight, and meter. The questionnaire consisted of 19 questions that evaluated six domains, as follows: sexual desire, arousal, lubrication, orgasm, satisfaction, and pain. Scores < 28 on the questionnaire were considered to represent sexual dysfunction. The results were analyzed using the t-test, Fisher test, Chi-square test, and Pearson correlation coefficient.

Results: The mean age of the subjects was 30.9 ± 5.8 years. The mean score for BMI in people with sexual dysfunction was 25.5 ± 4.09 , which was not statistically significantly different from those without sexual dysfunction. The mean score of central obesity was 0.75 ± 0.12 in people with sexual dysfunction; this was not statistically significant in comparison to those without sexual dysfunction. Among the female sexual function domains, only sexual desire ($P = 0.05$) and arousal ($P = 0.02$) had a significant correlation with BMI. There were significant relationships between waist-to-hip ratio (WHR) and sexual arousal ($P = 0.04$) and satisfaction ($P = 0.02$).

Conclusions: The only significant relationships were found between sexual desire and arousal and BMI and between central obesity and sexual arousal and satisfaction.

Keywords: Body Mass Index, BMI, Waist-to-Hip Ratio, WHR, Sexual Function, Women

1. Background

As a new epidemic, obesity has affected the global population. Obese people are extremely vulnerable to various diseases, including cardiovascular disease and diabetes. These diseases not only reduce their life expectancy but also undermine their quality of life (1). The rapid worldwide increase in the number of obese people has led to an obesity epidemic (2). Currently, in addition to the one to two-thirds of the world's population that is overweight, about 10% - 30% of people are obese in the developing countries (3). Nearly 66% of Americans are overweight and 32.2% are categorized as obese (4). A study carried out in Shiraz, Iran, showed the prevalence levels of obesity and overweight (body mass index [BMI] ≥ 25) among adults aged 25 - 55 years are 40.7% and 63.9% in men and women, respectively (5). The prevalence levels of obesity (BMI ≥ 30)

in men and women are 10.5% and 22.5%, respectively. This study revealed an increase of 5.8% in men and 17.4% in women over a period of 14 years (5).

In the recent studies, decreased sexual quality of life has been stated as a consequence of obesity (6). According to a study in the United States that included 7,243 healthy women aged 59 - 49 years, the prevalence of sexual dysfunction was reported to be 56.8% (7).

According to Amirkhani's study carried out in Tehran, Iran in 2011 - 2012, the female sexual function index (FSFI) domain scores suggested that 35.9% of participants had difficulties with desire, 10.9% had problems with arousal, 96.6% had issues with lubrication, 25.2% had difficulty achieving orgasm, 8% lacked sexual satisfaction, and 14.3% experienced pain during intercourse. Finally, 5.4% had issues with vaginal moisture, representing the least prevalent disorder (8). Female sexual dysfunction is a multifac-

torial problem that includes both organ and psychological elements. It seems that culture, religion and social issues are prepossessing features, since they can affect individuals' sexual lives (9, 10). Female sexual dysfunction is divided into four categories, as follows: sexual desire disorders, sexual arousal disorder, orgasmic disorder, and sexual pain disorder (11). Previous research has shown that sexual dysfunction is associated with obesity in men, but this association has remained unclear among women (12). Different studies have reported conflicting results in this regard. According to Kolotkin and colleagues (2006), a higher BMI is associated with greater disability in sexual relationships, which leads to a lower sexual quality of life. Women with class 3 obesity reported the most problems (6). In contrast, Bajos and colleagues carried out a study on 12,364 subjects aged 18 - 69 years (both men and women) to investigate the relationship between sexual function and obesity in France. The data analysis showed no significant relationship between female sexual function and natural BMI, overweight or obesity. However, the results showed that female decreased libido and male erectile dysfunction are associated with female excess BMI. About 55% of women and 35% of men were satisfied with their sexual life, but no significant relationship was observed among different BMI classes (13). In a study on the relationship between weight gain and sexual dysfunction, Esposito (2006) identified the effect of blood factors produced by fat cells as a contributing factor in sexual disorders (14).

Generally, the impact of obesity on sexuality is a multifaceted phenomenon that includes biological, social, and psychological factors. The importance of the present study stems from the conflicting results on the relationship between sexual dysfunction and BMI, the prevalence of obesity, and the considerable importance of sexual life. The study reports on the three possible mechanisms through which obese people may suffer from sexual dysfunction, as follows: a, insulin resistance and associated hormonal changes; b, dyslipidemia and related drugs; and c, psychological problems (15).

2. Objectives

This study aimed to investigate the relationship between sexual function and its domains with BMI and waist-to-hip ratio (WHR).

3. Methods

This cross-sectional study was conducted in 2014 - 2015. The sample consisted of women of reproductive age (15 - 45 years) who were referred to health centers in Shiraz, Iran.

The sample size was estimated as 514 people according to the prevalence ratio in Mazinani's (16) study and applying the following formula:

Equation 1.

$$N = \frac{z^2 pq}{d^2}, (z = 1.96, p = 31\%, q = 69\%, d = 0.04).$$

Women aged 15 - 45 years old who were married, residents of Shiraz, Iranian, and willing to participate in the study were included in the research. In contrast, women were excluded if they were breastfeeding and had given birth less than 8 weeks ago before the study, if they had not lived with their husbands within the past 6 months, or if they were pregnant. In this study, height, weight, and waist and hip circumferences were measured. The data were collected using an FSFI questionnaire, weight, and meter. To determine a subject's BMI, her height and weight were measured in standing position without wearing shoes. It is most accurate to measure height in meters and weight in kilograms. Onyx weight (made in Germany) that was previously adjusted with standard weights was used. Each participant had minimal clothes and an empty bladder when her weight was measured (17). BMI is an index derived from mass (weight) divided by the square of the body height (18); BMI ranges are as follows: less than 18.5 represents underweight, 18.5 - 24.9 represents normal weight, 25 - 29.9 is defined as overweight, 30 - 34.9 represents class 1 obesity, and over 35 is defined as class 2 obesity (19). To correctly measure waist circumference (WC) and hip circumference (HC), the following steps are used:

- 1, The subject is standing upright during the measurement, with arms relaxed at the side, feet evenly spread apart and bodyweight evenly distributed;
- 2, The WC is measured. With the patient standing, a tape measure is placed around middle, just above the patient's hipbones and below the lower margin of the last palpable rib in the midaxillary line;
- 3, The HC is calculated at a level parallel to the floor at the largest circumference of the buttocks. Both measurements are made with a stretch-resistant tape that is wrapped snugly around the subject but not so snugly that the tape is constricting.

WHR is calculated dividing WC by HC. The waist is measured just after the patient breathes out (20). People with a $WHR \leq 0.6$ were categorized as normal, while those with a $WHR > 0.6$ are considered as having abdominal obesity (21).

The FSFI questionnaire consists of 19 questions investigating the six domains of sexual desire, sexual arousal, lubrication, orgasm, sexual satisfaction, and pain during intercourse. The questions are scored based on a 0 or 1 - 5 scoring system; participants with a score of 28 or less are considered to suffer from sexual dysfunction (22, 23).

Sepehrian defined the FSFI's reliability by reporting a median alpha coefficient of 0.95 for total performance score of sexual function. The Cronbach's alphas were measured for sexual desire, sexual arousal, lubrication, orgasm, sexual satisfaction, and pain during the intercourse as 0.67, 0.88, 0.89, 0.86, 0.93, and 0.90, respectively (24). His findings represent the basis for the current study.

3.1. Data Analysis

SPSS 16.0 was applied to analyze the data. A t-test was performed to examine the relationship between the total score of sexual function and its components with the BMI and WHR results. We used the Chi-square test to assess the relationship between BMI and WHR with sexual function. A P-value of 0.05 was considered significant.

3.2. Ethical Considerations

After approval was received from the ethics committee of Shiraz University of Medical Sciences and permission was granted by the authorities of the health-treatment centers, sampling was carried out. First, all participants were provided with sufficient information about the study and its aims. They were assured that the researcher would respect their right to withdraw from the study at any stage and that their identities, answers, and information would remain confidential. Then, informed written consent was obtained. Each participant filled out the questionnaire, and her height, weight, WC, and HC were measured.

4. Results

The mean age of the subjects was 30.9 ± 5.8 years. In terms of education, about 26.7% of the women had received less than a diploma, and 73.3% had completed a diploma or college. A large number of participants (43.6%, $n = 224$) had normal BMI, while the lowest percentage (12%, $n = 5$) had class 2 obesity. Only about 15% ($n = 77$) had a WHR ≤ 0.6 , and the rest (85%, $n = 437$) had a WHR > 0.6 . The mean score of BMI in people with sexual dysfunction was 25.5 ± 4.09 . However, this score was similar to the mean for those with normal sexual function, which was 25.43 ± 3.8 . Although BMI scores were slightly higher in patients with sexual dysfunction than those without sexual dysfunction, this difference was not statistically significant ($P = 0.49$; Table 2).

The average score for central obesity was 0.75 ± 0.12 in people with sexual dysfunction, which was not statistically significant from the score for those without sexual dysfunction. Among the female sexual function domains,

only sexual desire ($P = 0.05$) and arousal ($P = 0.02$) had significant correlations with BMI. There were significant relationships between WHR and sexual arousal ($P = 0.04$) and satisfaction ($P = 0.02$).

A mean score of 0.75 ± 0.12 was reported for WHR in people with sexual dysfunction, while this score was 0.74 ± 0.12 in those with normal sexual function. Although WHR scores were lower in patients with sexual dysfunction than those without sexual dysfunction, this difference was not statistically significant ($P = 0.2$; Table 2).

Among all sexual function domains, only sexual desire ($P = 0.05$) and sexual arousal ($P = 0.2$) were significantly associated with BMI. In contrast, the other domains, namely quality of lubrication ($P = 0.00$), orgasm ($P = 0.6$), sexual satisfaction ($P = 0.28$), and pain ($P = 0.39$), did not show any significant correlation with BMI (Table 3).

There were significant links between sexual arousal ($P = 0.04$) and satisfaction ($P = 0.02$) with WHR. In contrast, the other domains of sexual desire ($P = 0.6$), lubricious quality ($P = 0.6$), orgasm ($P = 0.1$), and pain ($P = 0.7$) showed no association (Table 4).

5. Discussion

The association between sexual dysfunction and obesity is an intricate phenomenon comprising biological, psychological, and social agents. Based on our study, no significant correlation was found between BMI or WHR and sexual performance. In contrast, according to the statistical analysis, significant relationships were reported between BMI and sexual desire and arousal, as well as between WHR and sexual satisfaction and arousal.

Janik and colleagues (2015) showed that there was no significant relationship in overall sexual function scores between study groups in their study on women who had undergone weight loss surgery (25). In contrast to the other sexual domains, sexual desire and psychological arousal showed considerably higher scores in women who had undergone surgery. Moreover, the scores for sexual quality of life were considerably higher in women who underwent surgery. Weight loss surgery leads to more self-esteem and can consequently increase sexual desire and arousal.

Janik et al.'s (2015) results are consistent with the findings of this research (25). However, their study included women who had undergone surgery, whereas the present cross-sectional study was carried out on all women of childbearing age. In addition, the sample size in the present study was higher than that of Janik et al. (25).

In their study, Yaylali and colleagues observed no significant relationship between the total sexual function score and BMI or WHR (4). They found that about 86%

Table 1. Demographic Variables, BMI, and WHR with Society Research

Score of Variables	Frequency (%)	Mean \pm SD
Age		30.9 \pm 5.8
15 - 24	69 (13.4)	
25 - 34	314 (61.1)	
35 - 45	131 (25.5)	
Education		-
High school	137 (26.7)	
Diploma and university	377 (73.3)	
Body mass index (BMI)		25.48 \pm 4.007
Underweight	19 (3.7)	
Normal	224 (43.6)	
Overweight	197 (38.3)	
Obesity(class 1)	69 (13.4)	
Obesity(class 2)	5 (1)	
Waist-to-hip ratio (WHR)		0.74 \pm 0.116
Normal (WHR \leq 0.6)	77 (15)	
Abdominal obesity (WHR > 0.6)	437 (85)	

Table 2. Relationships Between Body Mass Index (BMI), Waist-to-hip Ratio (WHR), and Sexual Function

Score of Variables	With Sexual Dysfunction (%)	Without Sexual Dysfunction (%)	P-Value
BMI			0.59 ^a
Underweight	16 (4.3)	3 (2.1)	
Normal	159 (42.6)	65 (45.4)	
Overweight	141 (38.1)	56 (39.2)	
Obesity (class 1)	50 (13.7)	19 (13.3)	
Obesity (class 2)	5 (1.3)	0 (0%)	
Mean \pm SD	25.5 \pm 4.09	25.43 \pm 3.8 ^b	0.49
WHR			0.3 ^c
Normal (WHR \leq 0.6)	51 (13.9)	26 (18.2)	
Abdominal obesity (WHR > 0.6)	320 (86.1)	117 (81.8)	
Mean \pm SD	0.75 \pm 0.12	0.74 \pm 0.12	0.2

^aFisher exact test.^bt-test.^cChi-square test.

of obese women and 83% of controls suffered from sexual dysfunction. In their study, the total sexual function score had no significant relationships with anthropometric indicators, including BMI, WHR, and fat percent. These researchers also found a significant negative correlation between orgasm and BMI ($P = 0.007$), as well as a negative correlation between sexual satisfaction and BMI (P

$= 0.05$). Moreover, no significant correlation was found between testosterone levels and the total sexual function score. Yaylali et al. concluded that obesity does not seem to be a major cause of sexual dysfunction (4). In the present study, no significant relationship was observed between the sexual function score and BMI or WHR. Thus, these two studies were consistent, but no significant correlation was

Table 3 . Relationships Between Subscales of Sexual Function and Body Mass Index (BMI)

Score of Variables	Mean \pm SD	P-Value ^a
Desire		0.05
3.3 >	25.23 \pm 3.9	
3.3 \leq	25.95 \pm 4.18	
Arousal		0.02
3.4 >	25.16 \pm 3.96	
3.4 \leq	26.03 \pm 4.03	
Lubrication		0.9
3.4 >	25.48 \pm 3.93	
3.4 \leq	25.75 \pm 4.34	
Orgasm		0.6
3.4 >	25.43 \pm 3.95	
3.4 \leq	25.67 \pm 4.23	
Satisfaction		0.3
3.8 >	25.37 \pm 3.98	
3.8 \leq	25.81 \pm 4.08	
Pain		0.4
3.8 >	25.58 \pm 3.89	
3.8 \leq	25.26 \pm 4.25	

^at-test.

observed between orgasm and sexual satisfaction in the present work. This difference may be due to sampling and sample size.

In some studies, in addition to obesity, testosterone levels were also considered. For example, one study reported that the variation in androgen levels immediately after weight loss in obese women with regular menstrual cycles is due to the sustained increase in SHBG after weight loss, which leads to the decrease of free testosterone (26, 27). This androgen insufficiency is associated with reduced sexual desire. In contrast, greater androgen levels are correlated with increased sexual desire, arousal, orgasm, and satisfaction. Weight loss results in lower scores in these domains; in other words, sexual satisfaction increases as weight does (4). Our study only considered the relationship between obesity and sexual dysfunction.

Esposito and colleagues found that mean BMI was associated with female sexual function, as obese and overweight women had significantly lower scores for sexual arousal, lubrication, orgasm, and sexual satisfaction than those of normal weight ones; however, no relationship was observed between sexual function and WHR. The current study did not show such a relationship either; therefore, it seems that sexual dysfunction occurs prior to obesity. Ac-

cording to Esposito, the effect of weight gain appears after sexual disorders; thus, we can conclude that weight is not the only factor contributing to sexual dysfunction (12).

In their study carried out in Carolina, Kolotkin and colleagues demonstrated that higher BMI correlates with impaired sexual quality of life (6). More sexual dysfunction was reported in obese women than men. These authors also found that the sexual problems, including lack of orgasm and sexual desire, dysfunction, and avoidance of sexual activities are due to overweight in obese people. According to their findings, higher BMI could result in impaired sexual quality of life.

Obese women have more problems in their sexual quality of life than obese men (6). Our results were consistent with those of Kolotkin et al. (6). Other studies have shown a significant relationship between sexual function and BMI (1, 8, 28). The differences in the findings concerning whether high BMI correlates with sexual dysfunction may be due to variations in research methods in the sexual function field, diverse study backgrounds, and finally, differences among participants.

According to the results of this study, it seems that psychological and interpersonal factors may affect sexual function rather than BMI (as a physical factor). Other stud-

Table 4. Relationships Between the Subscales of Sexual Function and Waist-to-hip Ratio (WHR)

Score of Variables	Mean \pm SD	P-Value ^a
Desire		0.06
3.3 >	0.74 \pm 0.11	
3.3 \leq	0.76 \pm 0.12	
Arousal		0.04
3.4 >	0.76 \pm 0.12	
3.4 \leq	0.76 \pm 0.12	
Lubrication		0.6
3.4 >	0.74 \pm 0.12	
3.4 \leq	0.75 \pm 0.12	
Orgasm		0.1
3.4 >	.74 \pm 0.12	
3.4 \leq	0.76 \pm 0.12	
Satisfaction		0.03
3.8 >	0.74 \pm 0.11	
3.8 \leq	0.76 \pm 0.012	
Pain		0.7
3.8 >	0.75 \pm 0.12	
3.8 \leq	0.74 \pm 0.12	

^at-test.

ies have also suggested similar results (29-32). Adolfsson and colleagues showed that BMI is not significantly associated with sexual dysfunction (29). In this study, a significant association was found between increased BMI and impaired sexual satisfaction in men, but this difference was not observed among women. They concluded that this lack of association could be due to women's personal expectations of what is required for sexual satisfaction. This level of expectation seems to be lower in obese and overweight women than in those of normal weight. This may be rooted in social stigma and the treatment of obese people in the community, which leads to self-limitation, particularly in relation to important aspects of life like sexual desire and satisfaction (29). Adolfsson et al.'s results were similar to those of the present study. However, it should be noted that Adolfsson et al.'s research represented a population-based study that included both men and women, while our study only involved women of childbearing age (29).

Given the study results, it can be stated that the tangible emphasis on biological agents can lead to neglect of factors influencing satisfaction and sexual function, including sincerity, honesty, peace, communication, mutual respect, affection, and satisfaction with intimacy (33).

Women's sexual response is mostly affected by nonphysical agents. Indeed, the main factor in the female sexual response is the woman's sexual desire and satisfaction with partner rather than physical sexual desire (19).

5.1. Study Limitations

The limitation of this study included the difference in subjects' characteristics, which were beyond the researchers' control. In contrast, the lack of inclusion of postmenopausal women in the study is considered a strength, since the hormonal and psychological factors affecting sexual function caused by menopause could have been a confounding factor. To assess the possibility of a causal link between obesity and sexual dysfunction, an interventional study is recommended to investigate the impact of weight loss in women with sexual dysfunction.

5.2. Conclusion

The data analysis in this study revealed no statistically significant relationship between BMI and sexual function. Only sexual desire and arousal which were significantly associated with BMI. In terms of the WHR, there was no significant correlation between total sexual performance score and sexual satisfaction or arousal. Although obesity is not the major factor in sexual dysfunction, it can affect different aspects of sexual life. The data analysis suggested that more research should be conducted in this regard. Moreover, it would be beneficial for doctors, midwives, and other healthcare professionals to educate overweight and obese patients about the effects of their condition on sexual quality of life.

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Footnotes

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