WOMEN'S SEXUAL HEALTH

The Relationship Between Pelvic Floor Function and Sexual Function in Perimenopausal Women

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ABSTRACT

Introduction: Perimenopausal women with pelvic floor dysfunction have worse sexual function than women with functional pelvic floor muscle (PFM), especially in terms of libido, orgasm, sexual satisfaction, and total Female Sexual Function Index (FSFI) scores.

Aim: To explore the relationship between pelvic floor muscle function, hormone levels and sexual function in perimenopausal women.

Methods: An analytical cross-sectional study was conducted in 252 women aged 40−55 without pelvic floor disease with FSFI, pelvic floor muscle strength and the hormone levels.

Main Outcome Measure: The principle aim was to determine the relationships between sexual dysfunction, PFM strength, and hormone levels.

Results: In the functional PFM group, the proportion of menopausal hormone therapy was higher. The proportion of overweight in the dysfunctional PFM group was higher, and had more sexual desire disorder, more orgasm disorder, lower sexual satisfaction, and poor FSFI scores. The correlation between PFM strength, sexual function and female sex hormones suggested that PFM strength and libido, sexual satisfaction and FSFI score are significantly positively correlated, while PFM strength and sexual arousal disorder and vaginal lubricity had a positive correlation. In the multivariate analysis of the risk of sexual dysfunction among perimenopausal women, the higher the PFM strength, the lower the risk of sexual dysfunction.

Conclusions: Perimenopausal women with pelvic floor dysfunction have worse sexual function than women with functional PFM, especially in obese women, those with central adiposity, and not using hormone replacement therapy. The PFM strength was weakly positively correlated with sexual arousal, orgasm, sexual satisfaction, and FSFI score. **Zhuo Z, Wang C, Yu H, et al. The Relationship Between Pelvic Floor Function and Sexual Function in Perimenopausal Women. Sex Med 2021;9:100441.**

Key Words: Perimenopausal Women; Female Sexual Dysfunction; Pelvic Floor Muscle; FSFI; Hormone Therapy

BACKGROUND

Sexuality is an important part of human life, and sexual problems have an important impact on quality of life and emotional health. However, in China, due to the influence of traditional culture, women's status and sense of self with regard to their sexuality have been ignored. Female sexual dysfunction is a very prominent problem. Aslan et al[1] reported that female sexual dysfunction is closely related to the occurrence of domestic violence and increases in divorce rates, which seriously affects the relationships between husbands and wives, family stability and even social stability.

Female sexual dysfunction is a common clinical disorder involving pelvic floor dysfunction that affects women both before and after menopause, although prevalence increases during the postmenopausal years and with increasing age.[2] The perimenopausal period is an important phase in a woman's life. Due to

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the reduction in estrogen and the decline in ovarian function, symptoms such as atrophy of the pelvic floor muscles and ligaments, reduced blood supply, and degeneration of the mucosal epithelium may occur. Perimenopausal women experience obvious changes in their sexual function during this period, which seriously affect their quality of life. Female sexual dysfunction (FSD) refers to a condition in which women experience low libido, difficulty becoming aroused, orgasm disorders or pain during intercourse. Most people believe that perimenopausal sexual dysfunction is due to age, and few women actively seek treatment for their symptoms. In fact, perimenopausal FSD can be treated, and the foundation of treatment is early detection. However, there is a lack of authoritative measurement tools and no gold standard for the diagnosis of FSD.[3]

The Female Sexual Function Index (FSFI) scale is an internationally recognized authoritative measurement tool for female sexual function with a high degree of reliability. The scale is sensitive and reliable and has been translated into multiple languages for use as an effective tool for evaluating female sexual function. The scale includes both a total score and 6 individual dimension scores, including libido, sexual arousal, vaginal lubrication, orgasm, sexual satisfaction and pain during intercourse. Each dimension has a different diagnostic standard score,[4] and they may exist alone or concurrently.

The pelvic floor muscle layer of the human body is mainly composed of the levator ani muscles, such as the pubococcygeus muscle, the ischiococcygeus muscle, and the sacrococcygeus muscle. The pelvic floor not only supports the pelvic organs and shrinks the lower rectum and vaginal tissues but also affects the contraction function of the proximal urethral sphincter and bladder neck.[5] Pregnancy and childbirth damage the connective tissue, nerves and muscles of the pelvic floor. The enlargement of the uterus during pregnancy changes the axis of gravity of the body, as the uterus is pushed down by the pressure from the abdominal cavity to the vagina. After pressure from contractions acts on the pelvic floor, the muscles gradually relax to allow birth. This process further damages the pelvic floor muscles structure. In addition, hormonal changes in perimenopausal women and other factors affect the tissue of the female pelvic floor, causing the internal organs to shift as the body structures weaken. Low estrogen may be the cause of pelvic floor dysfunction, and postmenopausal estrogen deficiency may weaken the ligaments that support both the pelvis and the PFM.[6,7] Evaluating the function and strength of the pelvic floor muscles (PFMs) can provide feedback on a woman's ability to contract the PFMs as well as record changes in PFM function and strength.[8] Although weakness of the pelvic floor muscles (PFM) may be related to pelvic floor dysfunction, the understanding of their relationship with sexual dysfunction is limited.

The current clinical diagnosis of FSD relies mostly on patient complaints, questionnaires, and scale methods, and there is an urgent need to establish an accurate and effective diagnostic model. Therefore, it is expected that the establishment of diagnostic evaluation methods for patients with perimenopausal FSD and the evaluation of pelvic floor muscle function status will help improve the diagnosis rate of the disease and significantly improve the early clinical diagnosis of perimenopausal FSD. Epidemiological studies have shown that menopause is the main risk factor for the development of pelvic floor diseases, and the symptoms and severity of pelvic floor diseases increase significantly after menopause, which may be related to estrogen deficiency.[9,10] Although perimenopausal hormone fluctuations may be a risk factor for pelvic floor dysfunction, knowledge about their relationship with sexual dysfunction is limited. Therefore, the purpose of this study is to evaluate the relationship between PFM strength and sexual dysfunction in perimenopausal women.

METHODS

Study Design and Sample Selection

This is a cross-sectional clinical study to evaluate the level of pelvic floor dysfunction in perimenopausal women. This study included patients with all junior high school or above who attended Ningbo Huamei Hospital, University of Chinese Academy of Sciences from January 2018 to December 2019. The sample size is based on the annual number of outpatient visits in the perimenopausal outpatient clinic. Perimenopausal station included early menopausal transition marked by increased variability in menstrual cycle length, late menopausal transition marked by the occurrence of amenorrhea of 60 days or longer, and early postmenopausal marked by the end of the 12-month period of amenorrhea required to define that the years around final menstrual period had occurred. According to the literature, 23−29.9% of postmenopausal women suffer from pelvic floor functional problems.[11] In combination with this frequency, a 2-sided test is required, and using a 5% significance level, the probability of type I error $\alpha = 0.05$ and the probability of type II error $\beta = 0.2$. The estimated minimum sample size is 225 women. This study included healthy women 45−55 years of age with no clinical history of pelvic floor disease and who had recently experienced sexual activity (heterosexual intercourse at least once in the last month).

The exclusion criteria were chronic obstructive pulmonary disease; chronic asthma; smoking >20 cigarettes per day; patients with pacemakers; patients with acute urinary and reproductive tract infections; patients with pelvic and abdominal malignancies; megacolon; urinary or fecal incontinence; hysterectomy, vaginal surgery or surgery to correct urinary incontinence; history of pelvic floor reconstruction surgery; vaginismus including hyperactive pelvic floor; sexual dysfunction treatment; pelvic organ prolapse; patients with an intellectual disability, mental illness or unstable seizures; musculoskeletal disorders (multiple sclerosis, myasthenia gravis, poliomyelitis, spina bifida and cerebrovascular accidents); previous delivery of babies >4 kg; obesity (body mass index [BMI] >25 kg/m^2); smoking, alcohol or drug abuse; and illiteracy. The application of the inclusion and

exclusion criteria resulted in the inclusion of 252 women. All volunteers signed a free informed consent form, and the project was approved by the Institutional Review Board of Ningbo Huamei Hospital, University of Chinese Academy of Sciences.

The data collected included current age; age at menarche; parity and type of delivery (vaginal or cesarean section); weight; height; BMI (BMI = weight/height^2); waist circumference (WC, measured between the lowest rib and the anterior superior spine: WC >80 cm categorized as high); bowel habits (constipation: bowel movements fewer than 3 times a week and laborious bowel movements, hard stools, or low volume); use of perimenopausal hormone therapy (MHT) with estrogen and progesterone (for at least 6 months); physical activity level (active: 5 times a week for at least 30 minutes or 150 minutes/week, or resistance training or moderate-intensity aerobic exercise 3 times a week); and reproductive hormone levels: follicle stimulating hormone (FSH), estradiol (E_2) and anti-Müllerian hormone (AMH).

For the assessment of pelvic floor muscle strength during a gynecological examination, the patient was in the bladder lithotomy position when the examiner inserted their lubricated, gloved index and middle fingers approximately 4 cm into the vaginal opening and performed 2-finger palpation to evaluate the PFM strength. The woman was instructed to maximally contract her levator ani muscles without activating other muscle groups, namely, the abdominal muscles, gluteal muscles and adductors. The above muscle strength test was repeated 3 times to obtain the best result. According to the results of this process, the modified Oxford scale was used to score muscle strength from 0 to 5: Grade 0 = no contraction; Grade 1 = slight muscle twitching; Grade 2 = weak muscle contraction; Grade 3 = moderate muscle contraction; Grade 4 = good muscle contraction; Grade 5 = strong muscle contraction. Pelvic floor muscle strength is divided into functional PFM (score 2−5) and nonfunctional PFM (score 0−1) according to the strength of the PFM contraction.[12] All evaluations were performed by the same researcher (JL) who was blinded to the results of the other clinical data mentioned above.

Assessment of Sexual Function

The FSFI was used to assess sexual function.[13−15] The information from the completed questionnaires was entered into the database by well-trained research assistants. The questionnaire includes 6 items, including libido, sexual arousal, vaginal lubrication, orgasm, sexual satisfaction, and pain during intercourse. Each item consists of 2 to 4 questions for a total of 19 questions. Each item has a maximum score of 6 and the maximum total score is 36. The higher the FSFI score, the less pain/discomfort experienced and the better the sexual function. Individual scores <3.7 points indicate low libido or difficulty in sexual arousal, <4.3 points indicate difficulty with vaginal lubrication, <4.0 points indicate orgasm disorder and decreased sexual satisfaction, and <4.5 points indicate pain during intercourse.

Statistical Analysis

All variables were analyzed using the Shapiro-Wilk test and Levene's test for normality and homogeneity. The *t*-test compares the quantitative variables between the 2 groups; the chi-square test assesses the association between the frequency of categorical variables; and Pearson's bivariate correlation (r) analyzes the evaluation function (FSFI). For the correlation between PFM strength and sex hormone levels, a correlation coefficient (r) 0.21−0.40 indicates a weak correlation, 0.41−0.60 indicates a moderate correlation, 0.61−0.80 indicates a strong correlation, and >0.80 indicates a very strong correlation. The results are given with a 95% confidence interval (95% CI) and the associated *P* value. To evaluate the combined influence of more than 1 variable on the outcome, a multiple linear regression model with a backward elimination effect was selected and clinically verified. All tests used a 5% significance level or corresponding *P* value. The statistical analysis software SPSS version 21.0 was used for analysis.

RESULTS

The clinical data of the 252 perimenopausal women are shown in Table 1. According to the PFM strength, the clinical characteristics of 252 perimenopausal women were divided into functional (n = 142) and nonfunctional (n = 110) groups. Table 1 shows no significant difference between groups in terms of age, age at menarche, BMI, WC, number of pregnancies, delivery method, or constipation ($P > .05$), while the number of live births in the nonfunctional PFM group was significantly higher than that in the functional PFM group ($P < .05$). In terms of MHT, women in the functional PFM group had a greater degree of MHT use than women in the nonfunctional PFM group (4115.1 vs 158.4), and this difference was statistically significant ($P < .05$). Regarding BMI and WC, we compared the average overweight (BMI > 25.0 kg/m^2) and centripetal body fat deposition (WC > 80 cm) between the 2 groups of patients. The results showed that, compared with the functional PFM group, the proportion of overweight and centripetal body fat deposition in the PFM group was significantly higher. The comparison of endocrine hormone measurement data showed that there were no significant differences in the levels of follicle stimulating hormone, estradiol, and anti-Müllerian hormone between the functional PFM group and the nonfunctional PFM group ($P > .05$; Table 2).

In Table 3, when the PFM strength was compared with the FSFI score of perimenopausal women, women with nonfunctional PFM were found to have more sexual desire disorder ($P = .001$), more orgasm disorder ($P = .009$), lower sexual satisfaction ($P = .001$), and lower total scores ($P = .008$), and there were significant differences between the groups. Sexual arousal disorder and other aspects (vaginal lubrication, sexual satisfaction and dyspareunia; Table 3) were not significantly different between the groups ($P > .05$). The correlation between PFM

Table 1. The clinical characteristics of perimenopausal women according with PFM strength by dividing into functional PFM and nonfunctional PFM groups

Characteristics	Functional PFM (n = 142)	Nonfunctional PFM (n = 110)	*P* value
Age (mean, SD)	46.8, 4.8	48.5, 4.6	.47
Menarche age (mean, SD)	11.2, 5.0	10.9, 4.7	.31
BMI, kg/m^2 (mean, SD)	22.9, 4.9	23.5,6.1	.21
>25kg/m^2, n (%)	30.9	69.1	.02*
WC, cm (mean, SD)	75, 7.5	79, 8.1	.15
>80cm, n (%)	24.7	75.3	.01*
Gravidity, n (mean, SD)	4.3, 1.6	4.2, 1.4	.46
Child birth, n (mean, SD)	1.4, 0.7	2.5, 0.8	.02*
Parity, n (mean, SD)	1.3, 1.0	0.9, 1.2	.33
Vaginal delivery/Parity (%)	0.9, 0.3	1.1, 0.5	.29
Cesarean delivery/Parity (%)	0.8, 0.5	1.0, 0.3	.41
MHT use, n	41	15	.03*
Intestinal constipation, n	26	23	.54
Physical exercise, n	35	30	.58

*The difference was significant, if $P < .05$.
BMI = body mass index; MHT = menopausal hormone therapy; PFM = pelvic floor muscle; WC = waist circumference.
Values are expressed as mean (SD) or number (%).

strength, sexual function and female sex hormones is shown in Table 4. PFM strength and libido (r = 0.41, $P < .05$) (moderate correlation), sexual satisfaction (r = 0.36, $P < .05$) and FSFI total score (r = 0.37, $P < .05$) are significantly positively correlated, while PFM strength and sexual arousal disorder (r = 0.19, r ≤ 0.21; $P < .05$) and vaginal lubricity (r = 0.21, r ≤ 0.21; $P < .05$) had a significant but weak positive correlation. The follicle stimulating and anti-Müllerian hormone levels showed a significant weak positive correlation with PFM strength (r = 0.20, $P < .05$; r = 0.21, $P < .05$) but no correlation with the various scores of sexual function (Table 5).

In this study, we found that 89 of the 252 perimenopausal women had FSFI >26.5, and 163 women (64.68%) had FSFI ≤26.5. We subsequently conducted a multivariate analysis of the risk of sexual dysfunction in the group of perimenopausal women with sexual dysfunction (163 women with FSFI ≤ 26.5). According to the risk analysis of BMI, WC, number of live births, physical exercise and hormone levels, the results showed that the use of MHT (OR = 2.10; 95% CI 1.89−2.31; $P = .01$) and high PFM strength (OR = 2.52; 95% CI 2.41−2.63; $P = .01$) resulted in a lower risk of suffering from sexual dysfunction, while the other variables were not significant in the analysis.

Table 2. Comparison of hormone data of perimenopausal women according with PFM strength by dividing into functional PFM and nonfunctional PFM groups

Hormone data	Functional PFM (n = 142)	Nonfunctional PFM (n = 110)	*P* value
FSH, mIU/mL (mean, SD)	12.5, 6.68	15.51, 6.24	.24
E2, pg/mL (mean, SD)	63.86, 27.72	58.23, 22.12	.63
AMH, pmol/L (mean, SD)	4.79, 0.85	2.23, 0.61	.16

PFM = pelvic floor muscle.
Values are expressed as mean (SD). Values in bold are statistically different.

DISCUSSION

With the emphasis on sex education and the understanding of sexual health, people have gradually realized that sexual harmony

Table 3. Comparison of the different domain of sexual function and total score of the FSFI of perimenopausal women according with PFM strength by dividing into functional PFM and nonfunctional PFM groups

FSFI	Functional PFM (n = 142)	Nonfunctional PFM (n = 110)	*P* value
Desire score (mean, SD)	3.6, 1.7	2.5, 1.1	.001*
Arousal score (mean, SD)	3.0, 1.5	2.8, 1.2	.117
Lubrication score (mean, SD)	2.8, 1.1	2.5, 1.3	.098
Orgasm score (mean, SD)	3.2, 1.2	2.7, 1.3	.009*
Satisfaction score (mean, SD)	3.9, 1.4	3.2, 1.3	.001*
Pain score (mean, SD)	3.9, 1.8	3.7, 1.6	.307
Total score (mean, SD)	20.7, 6.0	17.8, 5.5	.008*

*The difference was significant, if $P < .05$.
FSFI = Female Sexual Function Index; PFM = pelvic floor muscle.
Values are expressed as mean (SD). Values in bold are statistically different.

Table 4. Correlation between PFM strength, hormone level and sexual function in 252 perimenopausal women

Data	PFM strength	FSH, mIU/mL	E2, pg/mL	AMH, pmol/L
PFM strength	1.0	***0.20****	0.05	***0.21****
Desire	***0.41****	0.06	0.02	0.02
Arousal	***0.19****	0.04	0.02	0.01
Lubrication	0.14	0.01	-0.01	-0.02
Orgasm	***0.21****	0.05	-0.02	0.02
Satisfaction	***0.36****	-0.01	-0.01	-0.01
Pain	0.05	-0.07	0.01	-0.08
FSFI, Total score	***0.37****	0.11	0.01	0.08

*The difference was significant, if $P < .05$.
FSFI = Female Sexual Function Index; PFM = pelvic floor muscle.
Bold italics and italics indicate significant P value.
Pearson's Correlation Coefficient (r). Values in bold are statistically different.

Table 5. Multivariate-adjusted analyses as a function of clinical characteristics, PFM strength and hormone data that influence risk to sexual dysfunction in the 163 perimenopausal women (FESI≤26.5)

Variable	OR	95% CI	*P* value
BMI (2 kg/m^2 increase)	0.54	0.47–0.60	.21
WC (2 cm increase)	0.67	0.57–0.77	.16
Child birth	1.40	1.32–1.50	.04
MHT	2.10	1.89–2.31	.01*
Physical excise	0.80	0.73–0.92	.13
FSH (5 mIU/mL increase)	0.90	0.83–0.99	.12
AMH (1 pmol/L decrease)	0.42	0.30–0.57	.56
PFM strength	2.52	2.41–2.63	.01*

*The difference was significant, if $P < .05$ (logistic regression).
OR = odds ratio.

and sexual health are an important part of an overall healthy and happy life. However, sexual health is a more complex concept involving physical, emotional, endocrine and other aspects of the reaction and is affected by factors such as the individual's social status, cultural background, and economic status.[16] In general, women's thoughts and emotions are more likely to be affected by the outside world, so there are many confounding factors that affect sexual function, including psychological, physical, and personal conditions; sexual partners; social pressure; and health. There are few reports on female sexual dysfunction during the perimenopausal period. Compared with male sexual dysfunction, the causes of female sexual dysfunction are more complicated, and sexual dysfunction is more prevalent in females than men.[17] It is necessary to conduct in-depth research on the causes, prevention and treatment strategies for FSD in women to improve both the prevention and treatment of FSD and to improve women's quality of life and happiness.

The assessment of the prevalence of sexual dysfunction will vary greatly due to different study populations, sample sizes, age ranges, and assessment methods. Psychological and physical health factors have an impact on every aspect of the FSFI.[18–20] Aging increases the prevalence of sexual dysfunction, but perimenopausal conditions can lead to female sexual dysfunction, regardless of age. Studies have found that the incidence of FSD increases with age, which is related to factors such as decreased ovarian endocrine function in perimenopausal women, which leads to decreased libido and increased pain during intercourse, suggesting that age affects sexual dysfunction. When estrogen is reduced, the risk of FSD is significantly increased, and menopause can lead to decreased sexual function.[21,22] With increasing age, the number of pregnancies and miscarriages increased significantly, but various sexual function indicators decreased significantly.[23,24] The weight increased by obesity squeezed the pelvic floor tissue downward, which leads to the increase of abdominal pressure and pelvic floor pressure, which makes the rectus abdominis and anal sphincter tense and induces or aggravates the occurrence of pelvic floor dysfunction diseases. Obesity and other endocrine and metabolic disorders and the sexual function of male sexual partners can significantly affect female sexual function.[25] In this study, perimenopausal women with pelvic floor dysfunction showed worse sexual function than women with functional PFM, especially in terms of libido, orgasm, sexual satisfaction, and total FSFI scores, especially overweight women, those with central adiposity, and women not using hormone replacement therapy. In our study, the patients were at least a junior high school degree or above, considering the different definition of low education level, which was related to the social development and economic level and the popularization of basic education. As a result, the influence of educational level on female sexual dysfunction was not evaluated. We will continue to include more population the study these factors effecting on the sexual dysfunction.

Sexual dysfunction is a common disease in women, so it is important to evaluate the impact of PFM on sexual function. In most studies,[26–28] research on female pelvic floor diseases has focused on complaints such as urinary incontinence and pelvic organ prolapse, while few studies have evaluated the effects of sexual behavior on the health of perimenopausal women. Studies have shown that[29] PFM strength is positively correlated with the FSFI domains of desire, arousal and orgasm and the total FSFI score. In this study, the PFM strength assessed by 2-finger palpation was weakly positively correlated with ovarian function and the FSFI domains of libido, sexual arousal, orgasm, sexual satisfaction, and the total FSFI score. Although the perimenopausal state may be a risk factor for weakened pelvic floor muscle strength, hormone replacement and pelvic floor muscle strength in this study determined the strength of sexual function. After pelvic rehabilitation training, it is unclear whether the improvement in sexual function is only due to the increase in PFM strength or the reduction in urinary incontinence symptoms and increased self-esteem. Therefore, we believe that with better ovarian function or hormone replacement during perimenopause,

PFM is improved, which can increase sexual desire and may improve vaginal elasticity and involuntary contraction, which are conducive to vaginal friction during intercourse, thereby improving orgasm reactions. Studies have shown that, among the prevalence and risk factors for pelvic floor disease, factors such as age, menopause, and lack of sexual desire can lead to reduced sexual activity, while symptoms of pelvic floor dysfunction are related to low libido and fewer orgasms in women over 40.[30] Estrogen plays a basic role in female sexual behavior because it promotes the elasticity and lubrication necessary for sexual intercourse. Low estrogen levels can affect women's sexuality by reducing vulvar tactile sensitivity and causing vaginal dryness and vaginal mucosal atrophy. In this study, MHT users had a lower risk of sexual dysfunction than nonusers, and low levels of FSH and higher levels of anti-Müllerian hormone were associated with weakened pelvic floor muscle function in women. It is well known that sexual dysfunction in postmenopausal women may be due to dyspareunia and reduced sexual activity caused by hypoestrogenism and vulvovaginal atrophy.[31] In our study of perimenopausal women, the level of estrogen was not related to the sexual functioning. This finding may be due to the perimenopausal women's estrogen not being completely depleted. Androgens increase the distribution and sensitivity of blood vessels in the clitoris, thereby increasing sexual function. Further research should examine estrogen, testosterone and DHEA thresholds and the relationship between these hormone and sexual function. We suggest that with perimenopausal ovarian function decline, MHT is an independent factor in the remission of sexual dysfunction. Topical estrogen therapy can be effective, especially for combined urogenital symptoms, which can improve vaginal lubrication and improve sexual function. If women have vasomotor symptoms, systemic MHT is recommended to relieve hot flashes and night sweats and improve vulvovaginal atrophy, thereby improving their sexual life and overall health.[32]

This study has some limitations. First, this is a cross-sectional study, and it is impossible to clearly establish the causal relationships between the various influencing factors. It is also not possible to see the continuity of the development of the same individual, intergenerational effects, and other aging factors. These other uncontrolled variables may affect all of the variables included in this study of women's sexual function. Second, tools for assessing sexual function need the participation of both sex partners. Although the FSFI score has been validated and approved as a screening tool for diagnosing sexual dysfunction, it has not evaluated feedback from sexual partners and cannot fully assess the condition or be used to confirm any diagnosis. Third, medical investigations involving private concerns mostly use questionnaires and clinical visits. Although there is ample time and privacy at home to consider the options for each issue, the results provided using our methods are more objective and reliable. In addition, this study used the commonly used method of digital vaginal examination to determine pelvic floor muscle strength, but due to the relatively strong subjectivity of the examination methods, there may be deviations. To minimize this effect, we employed a single examiner to perform all of these measurements. The examiner was systematically trained and blinded to the basic information and clinical data of the patients during the research process. There is an urgent need for clinical trials specifically designed to study the therapeutic effects of PFM on female sexual function and dysfunction. Therefore, we plan to further assess the condition of the pelvic floor muscles in future studies through the use of methods such as Glazer pelvic floor surface electromyography, vaginal pressure measurement, pelvic floor ultrasounds, etc[33–35] and to select more appropriate outcome measures to include in the study design.

CONCLUSION

In summary, this study shows that perimenopausal women with pelvic floor dysfunction have worse sexual function than women with functional PFM. Pelvic floor muscle strength is positively correlated with childbirth, female hormone replacement therapy, and ovarian function. Obesity is an especially relevant factor in people with central adiposity, and pelvic floor muscle strength is correlated with sexual function, especially in terms of libido, sexual arousal, orgasm and sexual satisfaction. MHT and PFM are independent factors in sexual dysfunction, and to determine the causal relationship between PFM strength and sexual dysfunction in perimenopausal women, randomized controlled trials must be conducted.

CONSENT TO PUBLISH

We have given our consent for our manuscript, pictures or tables to be published in the journal. We have seen and read the material to be published.

AVAILABILITY OF DATA AND MATERIALS

We declared that materials described in the manuscript, including all relevant raw data, will be freely available to any scientist wishing to use them for non-commercial purposes, without breaching participant confidentiality.

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STATEMENT OF AUTHORSHIP

Zhihong Zhuo: Conceptualization, Analysis and Manuscript Preparation, Data Analyses and Wrote the Manuscript; Chuhan Wang: Performed the Data on the Pelvic Muscle Strength, Analysis and Manuscript Preparation; Huimin Yu: Data Analyses and Wrote the Manuscript; Jing Li: Performed the Data on the Pelvic Muscle Strength.

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