

The Influence of Male Erectile Function on Female Sexual Function: A Cross-Sectional Study in Chinese Infertile Couples

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Abstract

Background

Infertility has a negative effect on sexual function in involuntarily childless couples, but the influence of male erectile function on their partner's sexual function in this special population was unclear. Therefore, we conducted this study to explore the influence of male erectile function on their partner's sexual function in Chinese infertile couples.

Methods

This cross-sectional research was conducted at the first affiliated hospital of Anhui Medical University (Hefei, China) between January and December in 2019. 324 consecutive couples with infertility attending the Reproductive Medicine Center and 326 female-age-matched couples without infertility from the Physical Examination Center were enrolled in this study. The sexual function of the female was assessed by sexual history and the Female Sexual Function Index (FSFI), etc. And their partners' sexual function was assessed by sexual history, International Index of Erectile Function-15 (IIEF-15), self-reported intravaginal ejaculation latency time (IELT), etc. Demographics (age, educational status, smoking, drinking, monthly income, type of infertility, etc.) and status of depression assessed by the Beck Depression Inventory-II (BDI-II) were also recorded.

Results

Infertile women have a higher proportion of sexual dysfunction than females without infertility (58.6% vs. 50.3%, $\chi^2 = 4.552$, $P = 0.033$). Sexual frequency, depression status and partner's erectile dysfunction (ED) are independent risk factors for FSD (ED: $\beta = 0.909$; OR=2.481; 95% CI [1.361–4.526]; $P = 0.003$). Furthermore, the total score of FSFI is positively correlated to the IIEF-15 score of partners ($r = 0.347$, $P < 0.001$). The majority of six domains of FSFI are also correlated to the five domains of the IIEF-15 ($P < 0.05$).

Conclusions

Male's erectile function is closely related to his partner's sexual function in Chinese infertile couples. So it is important to assess sexual dysfunction in infertile couples as a whole, and sexual concerns of couples should be assessed and addressed in this special population.

Background

Infertility is a worldwide medical problem affecting about 8%–12% of couples of childbearing age [1]. To give birth to a baby might be a vital expected outcome of sexual intercourse for many couples. In consideration of the causation of this disease, sexual dysfunction of either the male or female may account for some cases [2]. On the other hand, infertility may also cause sexual dysfunction in both

males and females due to decreased self-esteem, infertility-related distress and increased marital conflict etc. [3–6]

For males, a few researches have reported decreased sexual performance in males with infertility, and the impaired sexual dysfunction might be related to lower self-esteem and confidence [7–8]. Khademi, et al. found that the prevalence of erectile dysfunction (ED) was higher in men with infertility than in the normal population regardless of any degree of ED [9]. With regard to females, many previous studies have also found that the prevalence of female sexual dysfunction (FSD) was higher in infertile women than women with normal fertility [5, 10–12]. A diverse variety of risk factors may have a negative influence on the impaired qualities of sexual function in women with infertility, such as the female's age, educational level, duration of infertility and assisted reproduction treatment etc. [13–15]

Although infertility has been well established as being a risk factor for sexual dysfunction in infertile women, to our knowledge there are few investigations concerning the influence of male erectile function on female sexual function in infertile couples. For this reason, we conducted this cross-sectional study to explore the association between the male erectile function and their partner's sexual function.

Methods

Study Design and Population

A total of 324 consecutive couples who attended the clinic at the reproductive center in the First Affiliated Hospital of Anhui Medical University (Hefei, China) and diagnosed as infertility were enrolled in the study. Another 326 female-age-matched couples without infertility were enrolled as the control group. Infertility was diagnosed according to the inability to conceive after a year of unprotected sexual intercourse. Primary and secondary infertility were distinguished according to a history of pregnancy [16, 17]. All of the subjects were asked to fill out questionnaires including demographics, such as age, weight, height, marital status, occupational status, educational status, monthly income, residence, past medical history and sexual history, as well as the Beck Depression Inventory-II (BDI-II), IIEF15 scale (only for the males) and the FSFI (only for the females).

To be enrolled in this study, couples had to meet the following criteria: (1) be sexually active in the past one month (attempting sexual intercourse at least once per week); (2) be in a heterosexual stable sexual relationship with the same partner for at least half one year. Participants would be excluded if they suffered from major psychiatric or somatic disorders, or consumed any drug that could affect sexual function and/or psychological status, as well as if either of the couple was non-Chinese speaking. In order to exclude the influence of ejaculatory dysfunction, males who had premature ejaculation or delayed ejaculation were not included.

Ethical Approval

This study was approved by the Ethics Committee of the First Affiliated Hospital of Anhui Medical University. After having received complete information about the research, all the subjects signed written informed consents.

Main Outcome Measure

The Chinese version of the IIEF-15, which includes five domains: erectile function; intercourse satisfaction; orgasmic function; sexual desire; and overall satisfaction, were applied to assess erectile dysfunction and some other dimensions of male sexual function. The diagnosis of ED was based on an erectile function domain score of less than 26 [18]. The Chinese version of the FSFI, which was validated by Sun et al., was used to assess female sexual function. A score lower than the cut-off score of 26.55 on the FSFI suggested a sexual dysfunction in females [19]. The BDI-II was applied to assess status of depression, and a score >13 is considered as depression [20].

Bias and Sample size estimation

In order to address potential information, two authors inputted the data. And all individuals were chosen according to the strict criteria to address confounding bias. Based on previous studies and pre-survey, we assumed that the ratio, which is defined as the prevalence of FSD in infertile women (60%) to that in women with normal fertility (50%), was 1.2. With an allowable error of 10% and two-sided 95% confidence interval (CI), a total sample size of 627 was required. And 650 subjects were enrolled in this study.

Statistical analysis

Statistical analysis was carried out by the SPSS 22.0 software (SPSS Inc., Chicago, IL, United States). Quantitative data were expressed as mean \pm SD and two-tailed unpaired Student's t-test was used to compare differences. Difference of proportions expressed as percentage was performed by Chi-square test. To identify the independent risks of female sexual dysfunction, logistic regression analysis was performed. Furthermore, to illuminate the association between the IIEF-15 and FSFI as well as the domains of each, linear correlation was applied. All $P < 0.05$ were considered statistically significant.

Results

Comparison of female sexual function between women with/without infertility

The total FSFI score of women with infertility was 24.38 ± 6.27 , which was significantly lower than that in women without infertility (25.63 ± 5.73 , $P=0.05$). And the prevalence of FSD was 58.6% in the infertility

group, which was significantly higher than the 50.3% in the control group ($P \leq 0.05$). Table 1 presented the detailed data.

Table 1

Comparison of female sexual function assessed by FSFI between women with infertility and age-matched control.

	Women with infertility (N = 324)	Control (N = 326)	χ^2/t	P*
Age	30.93 ± 5.15	31.40 ± 5.19	1.174	0.241
FSFI total score	24.38 ± 6.27	25.63 ± 5.73	2.652	0.008
FSD			4.552	0.033
YES	190(58.6%)	164(50.3%)		
NO	134(41.4%)	162(49.7%)		
Desire score	3.30 ± 0.75	3.45 ± 1.19	20.30	0.043
Arousal score	3.49 ± 1.22	4.14 ± 1.26	6.709	<0.001
Lubrication score	4.60 ± 1.50	4.73 ± 1.32	1.141	0.255
Orgasm score	4.09 ± 1.50	4.33 ± 1.31	2.190	0.029
Satisfaction score	4.41 ± 0.96	4.61 ± 1.04	2.499	0.013
Pain score	4.50 ± 1.69	4.37 ± 1.58	0.990	0.323
*Differences between female with and without infertility were assessed by ttest or Chisquare test, as appropriate. FSD: Female sexual dysfunction.				

Comparison of demographics and clinical features in infertile female with/without FSD

There were no significant differences in age, BMI, residence, educational status, monthly income, smoking, drinking and type of infertility, or partner's age (all $P \geq 0.05$). However, it was found that females with FSD had significantly lower frequency of sexual intercourse, higher scores of FSFI and BDI-II, and a higher prevalence of partner's ED than those females without FSD (all $P \leq 0.05$)(See Table 2).

Table 2

Comparison of demographics and clinical features in infertile female with/without FSD.

	With FSD(N = 190)	Without FSD(N = 134)	χ^2/t	P*
FSFI Total Score	21.10 ± 6.21	29.04 ± 1.83	14.374	<0.001
Age	30.95 ± 5.25	30.90 ± 5.02	0.089	0.929
BMI	21.47 ± 2.58	21.57 ± 2.66	0.663	0.508
Sexual Frequency(Times/month)	5.10 ± 2.65	5.85 ± 2.57	2.545	0.011
Educational Status			5.799	0.055
Primary school	16(8.4%)	9(6.7%)		
Middle School	99(52.1%)	54(40.3%)		
University	75(39.5%)	71(53.0%)		
Residence			0.321	0.571
Rural	84(44.2%)	55(41.0%)		
Urban	106(55.8%)	79(59.0%)		
Type of infertility			0.746	0.388
Primary	90(47.4%)	70(52.2%)		
Secondary	100(52.6%)	64(47.8%)		
Childbearing history			0.068	0.794
No	148(77.9%)	106(79.1%)		
Yes	42(22.1%)	28(20.9%)		
Monthly Income			0.661	0.718
≥5000 CNY	29(15.3%)	25(18.7%)		
3000–5000 CNY	98(51.6%)	67(50.0%)		
<3000 CNY	63(33.2%)	42(31.3%)		
Smoking			0.318	0.573
Yes	5(2.6%)	5(3.7%)		
No	185(97.4%)	129(96.3%)		
Drinking			2.162	0.141
Yes	6(3.2%)	1(0.7%)		

	With FSD(N = 190)	Without FSD(N = 134)	c ² /t	P*
No	184(96.8%)	133(99.3%)		
BDI-II Score	7.71 ± 9.09	3.89 ± 5.39	4.354	<0.001
Depression			13.301	<0.001
Yes	41(21.6%)	9(6.7%)		
No	149(78.4%)	125(93.3%)		
Partners' Age	32.17 ± 5.79	32.00 ± 5.91	0.264	0.792
Partners' ED			13.465	<0.001
Yes	59(31.1%)	18(13.4%)		
No	131(68.9%)	116(86.6%)		
*Differences between female with and without FSD were assessed by ttest or Chisquare test, as appropriate. FSD: Female sexual dysfunction; BMI: Body mass index; CNY: Chinese yuan; BDI-II: Beck Depression Inventory-II; ED: erectile dysfunction. Depression was assessed by BDI-II.				

Independent risk factors of FSD

In order to identify independent risk factors of FSD in women with infertility, logistic regression analysis was applied. All the three significantly different factors (sexual frequency, depression, and partner's ED) found in the univariate analysis were all demonstrated as independent risk factors of FSD (all P ≤ 0.05). The detailed information is showed in Table 3.

Table 3
Multivariate analysis in infertile female with/without FSD

	β	SE	Wald	P*	OR	95% CI for OR	
						Lower	Upper
Constant	-2.658	0.501	28.165	< 0.001	0.070		
Sexual Frequency	0.090	0.046	3.863	0.049	1.094	1.000	1.197
Partner's ED							
No					1.000		
Yes	0.909	0.307	8.787	0.003	2.481	1.361	4.526
Depression							
No					1.000		
Yes	1.264	0.395	10.242	0.001	3.538	1.632	7.672
*Independent risks of FSD were assessed by logistic regression analysis. FSD: Female sexual dysfunction; ED: erectile dysfunction. Depression was assessed by Beck Depression Inventory-II.							

Association between IIEF-15 and FSFI

It was found that partner's ED is an independent risk factor of FSD in women with infertility. In order to illuminate the relationship between female sexual function and partner's erectile function, a linear correlation analysis was used to clarify the association between the IIEF-15 and FSFI. It was found that the total score of FSFI is positively correlated to the IIEF-15 score of their partners ($r = 0.347$, $P \leq 0.001$). Similar results were found in the majority of six domains the six domains of the FSFI and the five domains of the IIEF-15 ($P \leq 0.05$).

Table 4
Association between IIEF-15 and FSFI in couples with infertility

		IIEF-15 Score	Erectile Function	Intercourse Satisfaction	Orgasmic Function	Sexual Desire	Overall Satisfaction
Total FSFI Score	r	0.347	0.228	0.370	0.224	0.190	0.327
	p*	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Desire Score	r	0.158	0.057	0.162	0.103	0.158	0.189
	p*	0.004	0.308	0.004	0.065	0.004	0.001
Arousal Score	r	0.337	0.238	0.324	0.208	0.205	0.324
	p*	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lubrication Score	r	0.279	0.191	0.309	0.161	0.159	0.245
	p*	<0.001	0.001	<0.001	0.004	0.004	<0.001
Orgasm Score	r	0.324	0.218	0.351	0.201	0.177	0.297
	p*	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Satisfaction Score	r	0.308	0.223	0.325	0.212	0.120	0.284
	p*	<0.001	<0.001	<0.001	<0.001	0.031	<0.001
Pain Score	r	0.262	0.159	0.295	0.191	0.121	0.250
	p*	<0.001	0.004	<0.001	<0.001	0.029	<0.001
*Linear correlation was applied to illuminate the association between IIEF-15 and FSFI as well as each domains. IIEF-15: International Index of Erectile Function-15.							

Discussion

The current study suggested that male ED is an independent risk factor of partner's sexual function. And the male IIEF-15 score is positively correlated to their partner's FSFI score. To our knowledge, this study is the first investigation to explore the influence of male erectile function on their partner's sexual function in Chinese infertile couples.

In our study, it was found that the prevalence of FSD in infertile women was 58.6% in China. The prevalence of FSD in Chinese infertile women was not very similar compared to some other researches. In the investigation conducted by Facchin et al. in Italy, which enrolled 269 infertile women, 30 percent of participants reported FSD according to the FSFI cut-off score [4]. However, a meta-analysis conducted by Omani-Samani et al., which included 18 studies of 3419 infertile women in Iran, suggested that 64.3%

infertile Iranian women were suffering from FSD [21]. It is worth taking into account that different cultures, different populations and different research methods may have an effect on the prevalence of FSD.

Although a lot of researches have investigated the risk factors of FSD in infertile women, only several studies have considered the effect of male erectile function on their partner's sexual function in this special population, and contradictory conclusions have been presented in different studies. In the investigation by Khademi et al. in Iran, 100 infertile couples were surveyed, and it was found that husbands' erectile function was not related to any domains of their partners' FSFI score [9]. However, another research conducted by Nelson et al. in America found that there was a statistical correlation between women's FSFI and their partners' IIEF scores in 121 infertile couples [22]. In our study, it was found that male ED is an independent risk factor of FSD in females with infertility, and their total score of IIEF-15 is positively correlated to the FSFI score of partners. In addition, the majority of the five domains of the IIEF-15 are positively related to the six domains of the FSFI. These results indicate and support the suggestion that sexual dysfunction is not only an individual disorder, and partner's sexual situation should also be taken into consideration and screened when managing sexual dysfunction.

Several limitations in our research should be taken into consideration. Firstly, only 324 infertile couples in single center were enrolled in this study, which may lead to not very accurate conclusions. In a further investigation, more cases from multi-centers will be gathered. Secondly, factors of infertility were not taken into account in the analysis to detect the effects of the etiology of infertility on female FSD. We will collect more detailed information to clear etiologies of infertility. Thirdly, gonadal hormone levels were not tested for every subject and the association of gonadal hormone level and FSD was not assessed. Fourthly, a face-to-face interview without a private environment was used in this study, which might have led to individual's awkwardness and result in biases of the findings. In addition, a Chinese version of the IIEF-15 was applied in this study without validation.

Conclusions

Although FSD is not a very common cause of infertility, it is very important to assess female sexual function in infertile women, as infertility might have a negative influence on female sexual function. At the same time, male ED is an independent risk factor for partner's FSD in infertile couples. In this regard, we should take more concern on the partner's sexual function when dealing with infertile women with FSD to improve patients' care.

List Of Abbreviations

BDI-II: Beck depression inventory-II; BMI: Body mass index; CNY: Chinese yuan; CI: Confidence interval; ED: Erectile dysfunction; FSD: Female sexual dysfunction; FSFI: Female sexual function index; IIEF-15: International index of erectile function-15.

Declarations

Ethics approval and consent to participate

Written informed consent was obtained from all patients and this study was approved by the Ethics Review Board of The First Affiliated Hospital of Anhui Medical University (The First First Affiliated Hospital of Anhui Medical University-Quick-PJ2019-02-21, and The First First Affiliated Hospital of Anhui Medical University-Quick-PJ2019-07-07. The Ethics approval files are in Chinese).

Consent for publication

Not applicable.

Competing interests

All authors declare no competing financial interests.

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Authors' contributions

YC, DT and XZ designed the study. ZJ, DT, HG, CX and QW collected the data. DT, and HG analyzed the data. DT and QW wrote the paper. All authors read and approved the final manuscript.

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