

WOMEN'S SEXUAL HEALTH

Differences in the Sexual Function and Sexual Healthcare Needs of Pregnant Women Who Underwent In Vitro Fertilization and Women Who Conceived Naturally at Each Trimester: A Prospective Cohort Study



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ABSTRACT

Introduction: Infertility may negatively impact sexual function. Women with fertility problems usually prioritize treatment for infertility, but their sexual function in each trimester of pregnancy is poorly researched.

Aim: To compare the sexual function and sexual healthcare needs of women who underwent successful in vitro fertilization (IVF group) and women who conceived naturally (CN group) during each trimester.

Methods: Longitudinal prospective cohort study was conducted from August 2016 to July 2018. The IVF group ($n = 100$) was recruited from a leading reproductive treatment center; the CN group ($n = 100$), at the prenatal clinic of a medical center in central Taiwan. Questionnaires were mailed to women in the 10th–11th gestational week; 70 women in the IVF group and 75 in the CN group completed all 3 questionnaires, during the 10th–11th, 20th–21st, and 30th–31st gestational weeks.

Main Outcome Measures: Female Sexual Function Index and Nursing Intervention on Sexual Healthcare needs were compared between groups in each trimester.

Results: Most participants reported sexual dysfunction concerns during pregnancy. In the first trimester, the Female Sexual Function Index score was significantly lower in the IVF group than in the CN group (18.13 ± 6.27 vs 20.34 ± 5.87 , respectively; $P < .05$). Sexual healthcare needs at the permission level were significantly lower in the IVF group than in the CN group (10.78 ± 2.41 vs 11.79 ± 2.67 , respectively; $P < .05$).

Conclusion: The IVF group had lower sexual function in the first trimester than the CN group. Sexual function improved in the second trimester in the IVF group but decreased throughout pregnancy in the CN group. The CN group had a greater need for sexual healthcare nursing intervention at the permission level than the IVF group. **Huang C-Y, Liou C-F, Lu Y-C, et al. Differences in the Sexual Function and Sexual Healthcare Needs of Pregnant Women Who Underwent In Vitro Fertilization and Women Who Conceived Naturally at Each Trimester: A Prospective Cohort Study. Sex Med 2020;8:709–717.**

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Key Words: Sexual Function; Pregnancy; Infertility; Cohort Study; In Vitro Fertilization

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INTRODUCTION

Sexual health is an essential part of human well-being and a highly important component of quality of life.¹ Many conditions may considerably affect sexual health; disease-related processes, psychological conditions, life events, pregnancy, childbirth, and menopause can directly or indirectly impact sexual functioning and the well-being of patients and their partners and relationships.^{2,3} Pregnancy affects multiple physiological and mental functions that may inhibit sexuality. The variations in endocrine function, anatomic changes, and psychosomatic factors that occur during each trimester of pregnancy can lead to sexual dysfunction.^{4,5}

The increased levels of prolactin and oxytocin during pregnancy indirectly affect genital sexual arousal and subjective sexual arousal, whereas anxiety and perceived stress can adversely affect subjective arousal and quality of life.^{5,6} However, the higher levels of estrogen and progesterone in the second trimester increase blood flow to the genitals and can lead to heightened sexual desire.⁷ The female body image changes and the role of the mother is constructed during pregnancy, and psychological dimensions can come under great pressure. The sources of psychological stress during pregnancy include concerns about possible abortion, worry about the health of the fetus and the impact of a new born on the family dynamic; these feeling can make women feel anxious, fearful, and powerless and lead to a decrease in sexual activity.⁸

A recent study estimated the prevalence of sexual dysfunction in pregnancy was 81% based on a Female Sexual Function Index (FSFI) cutoff score of 26.55.⁹ Another study of sexual function during pregnancy in Poland found pregnant women were most sexually active in the second trimester and sexual function significantly decreased in the third trimester.¹⁰ Sexual experiences throughout pregnancy can promote commitment, love, trust, and intimacy between a couple.¹¹ Engaging in safe sexual activity during pregnancy is also a critical element for couples during the transition from being partners to being parents.¹² Unfortunately, many studies show that pregnancy is linked to lower sexual desire, a reduced frequency of sexual activity, poorer sexual satisfaction, and lower intimacy relationships, and an increased incidence of problematic vaginismus.^{13–15} Sexual problems may negatively impact marital relationships and increase stress within in a couple during pregnancy.¹⁶

The treatment and diagnosis of infertility also are important risk factors for sexual dysfunction among couples.¹⁷ Infertility is defined as the failure to become clinically pregnant after 12 months of regular unprotected sexual intercourse, either as an individual or with his/her partner.¹⁸ In vitro fertilization (IVF), an assisted reproductive technology used to treat infertility, involves induction of ovulation, egg retrieval, and embryo implantation.¹⁹ Increasing numbers of couples struggling with infertility now seek IVF treatment.²⁰ The infertility drugs used during assisted reproductive technologies, timed intercourse, the higher risk of abortion in the first trimester, and psychological factors can impact the sexual function of women struggling with infertility.²¹ Women with fertility problems usually prioritize treatment for infertility and rarely seek help with sexual problems.¹⁷

There is a demand among nurses to more actively provide sexual healthcare (SHC).²² The permission, limited information, specific suggestions, intensive therapy (PLISSIT) model provides a graded framework for SHC nursing.^{2,23,24} The PLISSIT model has been validated to improve sexual function in patients with various disease processes^{25,26} and during pregnancy.²³ By applying the “limited information” and “specific suggestion” levels of the PLISSIT, the Nursing Intervention on Sexual Healthcare (NISH) scale can be used to further assess the extent of nursing interventions required during SHC.²⁷

Most previous investigations of the sexual function of infertile women were conducted as cross-sectional studies, thus the changes in the various domains of sexual function and SHC needs during the entire course of pregnancy are poorly characterized. IVF generates a complex and distinctive coping experience for women, involving objective bodily experiences, identity confusion, grief and/or anxiety,²⁸ and poorer pregnancy health and birth outcomes.²⁹ The pregnancy experiences of women undergoing IVF are markedly different to the experiences of women who conceive naturally. Thus, the variations in the sexual function and SHC needs of both groups of women during pregnancy merit further exploration.

The purpose of this longitudinal survey was to explore and compare the sexual function and SHC needs of women who became pregnant after IVF and women who conceived naturally during each trimester of pregnancy. We hypothesized that (i) women who underwent IVF would have significantly lower sexual function during each trimester than women who conceived naturally and (ii) women who underwent IVF would have a greater need for SHC nursing interventions during each trimester than women who conceived naturally.

METHODS

Study Design

This longitudinal study was carried out at a single infertility center and a single medical center in Central Taiwan between August 1, 2016, and July 31, 2018. The study consisted of 2 parts. The first part was designed to explore the sexual activity and information-seeking behavior of couples during pregnancy after IVF (IVF group) and couples who conceived naturally (CN group). The second part aimed to survey the sexual function and need for SHC nursing interventions among both groups of pregnant women; the same 145 women were included in part 1 and part 2.

A power analysis (to compare the mean values for sexual function and need for SHC nursing interventions between independent groups) was calculated using G*power for two-tailed *t*-tests with an α of 0.05, effect size of 0.5, and power of 0.90. A sample size of 70 was required for each group. We recruited 100 participants to each group, assuming a 30% attrition rate.

Participants and Data Collection

All participants were married and heterosexual, as the Taiwan Assisted Reproduction Act states that all couples undergoing assisted reproduction must be legally married. The selection criterion for the IVF group was women who underwent IVF for their first pregnancy at a leading reproductive treatment center in central Taiwan; the CN group became pregnant naturally for their first child and were attending the prenatal clinic of a medical center in central Taiwan.

Women with a confirmed pregnancy received a maternal health booklet at their prenatal checkup. Women who meet the selection criteria for this study were introduced to the researchers in a private setting at the prenatal clinic area. The researchers explained the purpose and process of the study to each woman. The researchers also provided written information and oral explanations to pregnant women attending the prenatal clinic. All participants provided informed consent.

The researchers mailed the study questionnaires to each participant in their 10th–11th gestational week to collect data at 3 time points: during the first, second, and third trimesters.

Of the 100 women recruited to each group, 70 women in the IVF group and 75 women in the CN group completed all 3 questionnaires, during the 10–11th, 20–21st, and 30–31st gestational weeks. Overall, 55 participants did not complete all 3 questionnaires. The attrition rate for this study was 27.5%.

Main Outcome Measures

The pregnant women completed the questionnaires anonymously; all data are reported at the group level. A self-completed, standardized questionnaire in Traditional Chinese was

specifically designed for the study. The questionnaire consisted of 3 parts: sociodemographic data, the FSFI, and the NISH scale.

Sociodemographic Data

Information on the participants' age, education, years of marriage, and employment status was collected in the first trimester.

Female Sexual Functioning Index

The FSFI is a clinically validated, self-reported measure of sexual function that has been widely applied to assess female sexual dysfunction caused by primary disease or disease-derived processes.³⁰ The questionnaire consists of 19 items and 6 sub-categories: desire (items 1–2), arousal (items 3–6), lubrication (items 7–10), orgasm (items 11–13), satisfaction (items 14–16), and pain (items 17–19). Items 1, 2, 15 and 16 are scored on a range of 1–5, the other items are scored on a range of 0–5. The scores were calculated for each subscale. Each possible answer in the FSFI carries a number of points, and the points are summed to obtain 6 domain scores and an overall score; higher scores signify better sexual function.

Table 1. Participant characteristics

Variable	IVF group (<i>n</i> = 70 dyads)	CN group (<i>n</i> = 75 dyads)	<i>P</i>
	Woman N (%)	Woman	
Age, mean (SD), y	34.46 (4.52)	31.35 (4.32)	<.001
Married, <i>n</i> (%)			<.001*
<1 y	6 (8.57)	30 (40.00%)	
1 ≤ 3 y	21 (30.00)	18 (24.00%)	
3 ≤ 5 y	21 (30.00)	12 (16.00%)	
≥5 y	22 (31.43)	15 (20.00%)	
Complication			
First trimester	20 (28.57)	26 (34.67)	.430
Second trimester	24 (35.82)	17 (24.29)	.140
Third trimester	17 (31.48)	16 (26.67)	.557
Education level			.501
Senior high school	8 (11.43%)	13 (17.64)	
University	51 (72.86%)	52 (69.33%)	
Masters	11 (15.71%)	10 (13.33%)	
Occupation			.4837
Agriculture	1 (1.43%)	0 (0.00%)	
Manufacturing	10 (14.29%)	9 (12.00%)	
Wholesale and retail	15 (21.43%)	9 (12.00%)	
Service industry	28 (40%)	33 (44.00%)	
Unemployed	16 (22.86%)	24 (32.00%)	
Religious			.2451
Yes	53 (75.72%)	62 (82.67%)	
No	17 (24.29%)	13 (17.33%)	

CN = women who conception naturally; IVF = women with In vitro fertilization.

**P* < .05 was considered statistically significant, independent *t* test.

Based on a previous systemic review of the measurement properties of the FSFI, the FSFI meets the psychometric criteria for internal consistency, reliability, and criterion validity. Cronbach's alpha is > 0.70 and < 0.95 for all subscales, which provides evidence of sufficient internal consistency and moderate quality. The criterion validity was rated as sufficient with high quality.³¹

Nursing Intervention on Sexual Healthcare

The NISH scale was developed as per the PLISSIT model.²⁷ We asked participants to rate their need for each SHC intervention listed on the NISH scale. The NISH is grouped into 3 levels: permission, limited information, and specific suggestion. Each item is answered using a five-point Likert-type scale (1 = definitely not needed to 5 = definitely needed); higher scores indicate greater need for a SHC intervention.

The NISH scale exhibited good psychometric properties in a previous study of a Chinese population. Cronbach's alpha ranged between 0.82 and 0.95 for each of the 3 domains and 0.96 for the overall scale. The 3 factors accounted for 72.42% of the variance in the total scale.²⁷ Cronbach's alpha was 0.95 in this study.

Statistical Evaluation

Data were analyzed using SAS Statistics 20.0 (SAS Inc, Chicago, IL, USA). Descriptive statistics, means, and frequencies

were determined to inspect the distributions of the data. Independent *t*-tests were used to compare normally distributed parameters between the IVF and CN groups. The Wilcoxon rank sum test and Fisher's exact test were used to analyze the need for SHC interventions. Conventional critical two-sided *P*-values less than .05 were considered significant. Missing data were imputed using the overall mean.

Ethical Considerations

Ethical approval for this human research study was obtained from the Institutional Review Board of Medical University Hospital (IRB No. CS16047). Data are reported using summary statistics and group-level results. All participants were provided with a cover letter explaining the purpose and reputation of the study, their right to decline participation at any time, a guarantee of anonymity, and our gratefulness for their participation. The study information sheet specified that completion and return of the questionnaire implied the participant's consent to participate in the study.

RESULTS

Description of the Participants

70 women who successfully underwent IVF (IVF group) and 75 women who conceived naturally (CN group) completed the 3

Table 2. Mean item scores for the subscales of the Female Sexual Function Index

Subcategories	First trimester	<i>P</i>	Second trimester	<i>P</i>	Third trimester	<i>P</i>
FSD concerns (%)		.325		.9951		.323
CN	62 (82.67)		53 (75.71)		52 (86.67)	
IVF	55 (78.57)		51 (76.12)		45 (83.33)	
FSFI		.031*		.7934		.389
CG	20.34 (5.87)		19.75 (6.17)		18.33 (5.93)	
IVF	18.13 (6.27)		19.46 (6.34)		17.38 (5.71)	
Desire		.157		.3484		.574
CN	3.02 (1.14)		3.21 (1.32)		2.78 (1.28)	
IVF	2.75 (1.18)		3.01 (1.14)		2.65 (1.06)	
Arousal		.003*		.3310		.163
CN	2.83 (1.97)		2.60 (2.12)		2.19 (2.04)	
IVF	1.81 (2.09)		2.24 (2.14)		1.67 (1.84)	
Lubrication		.984		.6950		.432
CN	3.52 (0.87)		3.53 (0.84)		3.49 (0.80)	
IVF	3.51 (0.90)		3.59 (0.92)		3.36 (0.83)	
Orgasm		.054		.5126		.586
CN	3.16 (1.24)		2.94 (1.18)		2.72 (1.14)	
IVF	2.76 (1.25)		3.08 (1.30)		2.60 (1.18)	
Satisfaction		.029*		.7909		.240
CN	3.13 (2.54)		2.61 (2.51)		2.25 (2.53)	
IVF	2.19 (2.61)		2.49 (2.56)		1.7 (2.43)	
Pain		.004*		.4156		.060
CN	4.67 (1.40)		4.74 (1.49)		4.91 (1.48)	
IVF	5.30 (1.18)		4.95 (1.51)		5.39 (1.17)	

CN = women who conception naturally; IVF = women with In vitro fertilization; FSD = female sexual dysfunction; FSFI = Female sexual function index. **P* < .05, independent *t*-test.

questionnaires, during the 10–11th, 20–21st, and 30–31st gestational weeks. The mean age of the participants was 34.46 ± 4.52 years for the IVF group and 31.35 ± 4.32 years for the CN group ($P < .001$; Table 1). All women were married; 36% and 61.43% of women in the CN group and IVF group, respectively, had been married for more than 3 years; the IVF group had been married for significantly longer than the CN group ($P < .05$).

There were no significant differences in the incidence of any obstetric or non-obstetric complication (including bleeding, gestational diabetes, gestational hypertension) between the groups during each trimester of pregnancy. There were no significant differences in educational level, occupation, or religion between the IVF and CN groups (Table 1).

The attrition rate for this study was 27.5%. The demographic data for the missing cases in the IVF and CN groups were not significantly different to the participants included in the analysis for the IVF and CN groups, respectively.

Comparisons of Female Sexual Function Between the IVF Group and CN Group

Most females had sexual dysfunction concerns during pregnancy; the proportions of women with sexual dysfunction concerns in each trimester were not significantly different between groups (75.71–86.67% in the CN group and 76.12–83.33% and the IVF group; Table 2). In the first trimester, the sexual function index score was significantly lower in the IVF group than in the CN group ($P < .05$). The scores for each subcategory of the FSFI varied with the trimester of pregnancy. The FSFI domains that varied significantly between groups in the first trimester were sexual arousal, satisfaction, and pain. The IVF group was less confident or had a lower frequency in the sexual arousal stage, was less satisfied with their sex life and relationship, and experienced higher levels of discomfort

during intercourse than the CN group in the first trimester. The differences between the CN and IVF groups for the other domains—libido, lubrication and orgasm—were not significant. It is worth noting that the scores for the 3 domains that were not significantly different between groups were generally higher in the CN group than the IVF group in the first trimester. However, the IVF group had higher scores for the lubrication and orgasm domains than the CN group in the second trimester. Therefore, hypothesis 1—that that women who underwent IVF would have significantly lower sexual function during each trimester than women who conceived naturally—was supported during the first trimester.

Comparison of SHC Nursing Intervention Needs During Each Trimester

Table 3 summarizes the need for SHC nursing interventions in the IVF and CN groups and presents the mean summed scores and mean item score at each level (ie, permission, limited information, and specific suggestion) during pregnancy. The summed scores for each level were lower in the IVF group than those in the CN group during pregnancy; however, the summed scores for each level were not significantly different between the IVF and CN groups, except for the permission level in the second trimester (10.78 ± 2.41 , 11.79 ± 2.67 , $P < .05$). Furthermore, based on the mean item score, the need score was highest for the limited information level over all 3 trimesters. Therefore, hypothesis 2—that women who underwent IVF would have greater need for SHC nursing intervention during each trimester than women who conceived naturally—was supported in the 2nd trimester.

Trends in Female Sexual Function During Pregnancy

Figure 1 presents the 6 domain scores for procedural function during pregnancy. The trends in the 3 domains of desire,

Table 3. Need for sexual healthcare nursing interventions

Trimester/levels of model	IVF group Summed mean(SD)/Mean of item scores	CN group Summed mean(SD)/Mean of item scores	<i>P</i>
First trimester			
Permission	11.11 (2.71)/2.22	11.81 (3.01)/2.36	.144
Limited information	16.56 (4.34)/2.36	16.85 (4.08)/2.41	.673
Specific Suggestion	14.70 (3.19)/2.1	15.45 (4.17)/2.21	.221
Second trimester			
Permission	10.78 (2.41)/2.16	11.79(2.67)/2.36	.024*
Limited information	16.21 (4.06)/2.31	16.99 (4.34)/2.43	.282
Specific Suggestion	14.70(2.94)/2.1	15.13(3.84)/2.16	.465
Third trimester			
Permission	11.02(2.58)/2.20	12.37(5.47)/2.47	.091
Limited information	15.98(3.89)/2.28	17.95(8.93)/2.56	.125
Specific Suggestion	14.81(3.11)/2.12	16.95(9.61)/2.42	.108

CN = women who conception naturally; IVF = women with In vitro fertilization.

* $P < .05$, Wilcoxon rank sum test and Fisher's exact test.

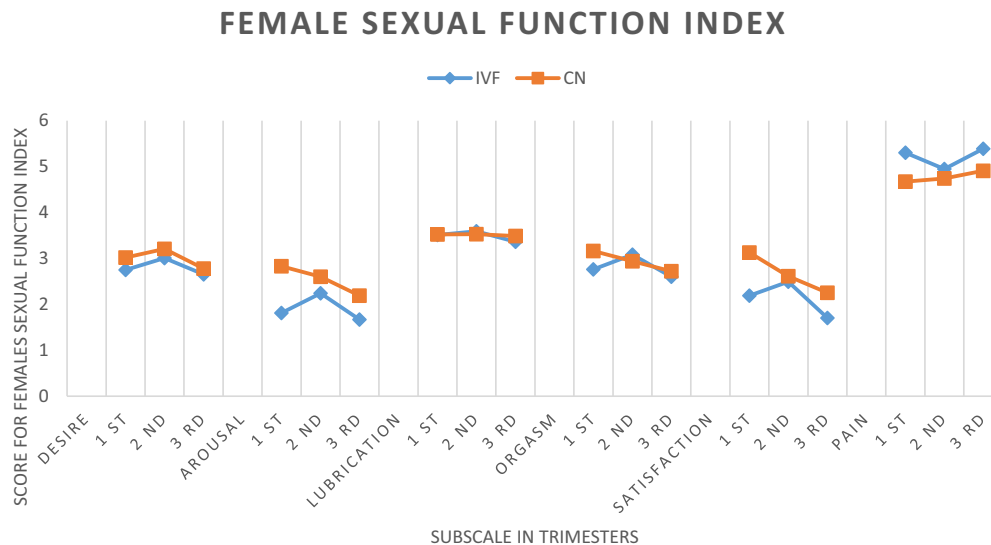


Figure 1. Trends in female sexual function during pregnancy. IVF = women with in vitro fertilization; CN = women who conception naturally. 1st = first trimester; 2nd = second trimester; 3rd = third trimester.

lubrication, and orgasm were similar between the CN and IVF groups. In the CN group, the arousal and satisfaction scores gradually decreased during pregnancy. In the IVF group, the desire, arousal, orgasm, and satisfaction scores increased in the second trimester and then fell in the third trimester.

DISCUSSION

This is the first longitudinal study to compare the sexual function and SHC needs of women who underwent IVF and women who conceived naturally (CN) during their first pregnancy. Regardless of whether the participants were in the CN group or IVF group, more than 75% of women reported sexual dysfunction concerns in each trimester, consistent with previous reports of a high prevalence of sexual dysfunction in pregnant women.^{9,13} The high proportion of pregnant women who worry about sexual dysfunction indicates that sexual function concerns are a significant burden to pregnant women. Interestingly, fewer women in the IVF group than those in the CN group reported sexual function concerns, although the difference was not significant. The strong tendency for women who become pregnant through IVF to divert attention to something other than their pregnancy could be one explanation for this finding. IVF technology gives hope to women with infertility,³² though the higher physical and psychosocial pressures experienced by women undergoing or who become pregnant through IVF^{32,33} may lead to a lower interest in sex.³⁴ Sexual function is an essential component of quality of life, and a reduction in sexual function may lead to emotional stress and negatively affect an individual's biopsychosocial life balance.

In the first trimester, the FSFI score was significantly lower in the IVF group than that in the CN group, and the sexual intercourse pain score was significantly higher in the IVF group

than that in the CN group. There was no significant difference between the 2 groups during the other trimesters, and vaginal lubrication was almost exactly same in the CN group and IVF group throughout pregnancy. We infer that the physiological responses of the women in the IVF group to sexual excitement lead to adequate vaginal lubrication but that their psychological responses did not reach the same level of psychological satisfaction in the first trimester. The psychological response to excitement was lower in the IVF group than that in the CN group during the first trimester. These results are in line with the inconclusive link between genital sexual arousal and subjective sexual arousal.^{35,36} Our results indicate that women who become pregnant through IVF may suffer higher levels of anxiety or stress during their first pregnancy, which ultimately decreases subjective sexual arousal. Thus, it is important to further study the mood, anxiety, and stress perceived by women who become pregnant through IVF in the first trimester of pregnancy.

We also explored the needs of pregnant women for SHC nursing interventions. The highest needs for SHC in both groups were limited to the information level, which indicates nurses could provide information on specific sexual issues and correct common misconceptions. This interesting finding is inconsistent with previous studies, which reported the permission level was the first or core level of the PLISSIT model among Iranian women who became pregnant naturally and in an assessment of the perspectives of nurses in Taiwan.^{23,37} Patients in eastern medical services may possibly have less authority at the permission level owing to the medical professional-centered paradigm of health care.³⁸ This finding provides a reminder of how nurses could actively provide SHC education in clinical practice. Another issue related to the "limited information" level of SHC was identified. The institutions involved in this study provide patients with an

education booklet about sex life during pregnancy, though the content mostly uses a cautionary tone when referring to sexual activity. Unfortunately, the importance of sexual function during pregnancy is not mentioned in the booklet or discussed at routine prenatal care visits. Most of the information warns pregnant women about sexual activity, and there is a lack of information on how to cope with the stress of possible marriage/relationship issues and no suggestions of alternative ways to make couples feel loved and cared for if they stop sexual activity. The study also revealed a significant difference at the permission level between groups in the second trimester: the CN group had a greater need for SHC at the permission level than the IVF group. This corresponds with the lower sexual function score in the second trimester among the women who conceived naturally. We recommended specific suggestions could be provided to pregnant women on different ways to make their partners feel loved and cared for; for example, massage, cuddling, oral sex, and use of adult toys for men.

The trends in sexual function during each trimester varied between groups. The arousal and satisfaction scores gradually decreased during pregnancy in the CN group, and the arousal, orgasm and satisfaction scores increased in the second trimester and then decreased in the third trimester in the IVF group. These varied trends provide an interesting viewpoint on the sexual function of pregnant women. The trends observed in the IVF group are in line with those of a previous study, which reported pregnant women were most sexually active during the second trimester.¹⁰ The symptoms of discomfort in the first trimester have generally resolved, and women report positive sensations of well-being during the second trimester, which may increase sexual desire, arousal, and satisfaction during the second trimester.¹¹ Use of auxiliary fertility medicine during IVF treatment may also explain the differences between groups: stimulation with high concentrations of progesterone can increase circulation in the vagina. Therefore, women who underwent IVF may have better vaginal lubrication than the women in CN group in first trimester, thus IVF is unlikely to impact sexual function beyond the first trimester of pregnancy. Women who successfully conceived after IVF confirmed that psychological stress persisted throughout their first pregnancy.¹⁷ Therefore, we recommend that health education for IVF couples in the first trimester should include a counseling course to ease the pressure of persistent psychological stress.

However, if sexual activity is approached with understanding between couples and pregnant women receive appropriate specific suggestions, couples can still achieve satisfactory sexual function. PLISSIT-based counseling can reduce sexual problems and increase the sexual function of pregnant women.²³ Nurses must pay more attention to the negative impact of reduced sexual function among pregnant women and actively provide appropriate, comprehensive SHC suggestions in the clinic.

Limitations

3 limitations of this study should be noted. First, potential participants were only contacted after their pregnancy was confirmed, thus it was not possible to collect baseline data on sexual function before pregnancy. Auxiliary fertility medicine during IVF treatment may elevate the concentration of progesterone, which enriches vaginal blood flow and affects sexual function. After confirming pregnancy and obtaining informed consent, future studies could immediately ask the participants to fill in a retrospective questionnaire to understand sexual function before pregnancy and establish baseline information. Second, this study was only conducted within 2 obstetric centers using a convenience sampling approach and focused on sexual function. Although these hospitals are a leading medical institution and reproductive treatment center in central Taiwan, this may lead to selection bias and limits the generalizability of the results. Additional medical institutions should be included in future studies. Third, the age of the participants and length of marriage were significantly different between the IVF and CN groups. However, sexual function did not vary significantly between groups in the second and third trimesters. The possible impacts on sexual function need to be confirmed by further research.

CONCLUSIONS

This study confirms that pregnant women who underwent IVF have lower sexual function in the first trimester than women who conceived naturally, though the differences in sexual function between groups were not significant during the remainder of pregnancy. Both pregnant women who underwent IVF and women who conceived naturally have high demands for provision of SHC information. Sexual function improved in the second trimester in women who underwent IVF but gradually decreased during pregnancy in women who conceived naturally. These findings provide an important knowledge base for continued educational design to enable nurses to build competency in the management of patients' sexual function. Furthermore, distinct structured evidence-based SHC interventions are required for pregnant women treated with IVF and women who conceived naturally.

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