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Original Article

Relationship Between Sexual Health Literacy and Sexual Self-Efficacy Among Infertile Women: A Cross-Sectional Study at a Public Infertility Treatment Center in Gorgan, Iran, During 2025-2026

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Abstract

Introduction: Infertility can adversely affect sexual quality of life and compromise treatment outcomes. This study was conducted to investigate the relationship between sexual health literacy and sexual self-efficacy among infertile women attending a public infertility treatment center.

Methods: This cross-sectional study was conducted from May 2025 to January 2026 at the largest public infertility referral center in Gorgan, Iran. A convenience sampling method was used to recruit 186 infertile women. Data were collected using a demographic and clinical information form, the Sexual Health Literacy Questionnaire (SHLQ), and the Sexual Self-Efficacy Questionnaire (SSEQ). Statistical analysis was performed using descriptive statistics, Pearson's correlation coefficient, and Chi-square test via SPSS version 26, with the significance level set at $P<0.05$.

Results: The mean total score of sexual health literacy was 69.56±23.35, indicating an adequate literacy level. The mean sexual self-efficacy score was 18.79±7.60, falling within the moderate range. A strong, positive, and statistically significant correlation was found between total sexual health literacy and sexual self-efficacy ($r=0.643$, $P<0.001$). This significant positive correlation was also consistently observed across all individual dimensions of the sexual health literacy questionnaire and sexual self-efficacy (r range = 0.643-0.740, $P<0.001$).

Conclusion: This study identified a strong positive correlation between sexual health literacy and sexual self-efficacy among infertile women. Higher levels of sexual health literacy were associated with greater sexual self-efficacy. Future longitudinal and interventional studies are warranted to explore whether targeted educational interventions may enhance sexual self-efficacy and overall sexual well-being in this population.

Keywords: Health literacy, Sexual health, Self-efficacy, Infertility, Female

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Introduction

According to the World Health Organization (WHO), infertility refers to the inability to establish a clinical pregnancy following 12 months of regular unprotected sexual intercourse.[1] In April 2023, the WHO reported that approximately one in six people worldwide experience infertility during their lifetime.[2] A recent study has reported that approximately 11.8% of Iranian women are affected by infertility.[3]

Infertility is associated with numerous adverse psychosocial consequences, including depression, anxiety, anger, and impaired marital quality of life.[4] Evidence further indicates a detrimental effect on sexual self-efficacy, with infertile women reporting significantly lower self-assurance in sexual contexts compared to their fertile counterparts.[5,6] Higher sexual self-efficacy is linked to greater perceived control over one's sexual life, a stronger sense of sexual competence, better management of the sexual response cycle, increased sexual activity and satisfaction, and a greater propensity to seek, adhere to, and resolve sexual problems through treatment.[7,8] Furthermore, infertility and sexual dysfunction exhibit a complex bidirectional relationship, with sexual dysfunction being more prevalent among infertile couples.[9] This comorbidity can adversely affect the course and outcome of infertility treatments,[10] underscoring the critical need to address sexual health issues in this population.[11]

Studies in this field indicate that a primary underlying factor contributing to sexual dysfunction is a lack of

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sexual health knowledge and inadequate education.[12] One key determinant of sexual health and its quality is sexual health literacy,[13] which has been identified as a significant factor influencing sexual self-efficacy.[11] Research conducted by Wong et al (2021) supports this view, highlighting that greater sexual health literacy is essential for fostering comprehensive sexual well-being.[14] Another study conducted by Banaha et al (2023) in Babol, Iran, showed that strengthening sexual self-efficacy in infertile women was associated with more positive outcomes, including higher success rates in infertility treatments.[15]

Infertility frequently coexists with sexual dysfunction and reduced sexual self-efficacy, both of which can adversely affect sexual quality of life, assisted reproductive technology outcomes, and treatment compliance. While the importance of sexual health literacy in promoting sexual well-being is increasingly recognized, existing studies among infertile couples in Iran have been limited to specific regions, such as Tehran [16] and Kerman.[5] These studies have reported varying levels of sexual health literacy without examining its association with sexual self-efficacy.

The relationship between these two variables remains underexplored, especially in socioculturally diverse settings such as Golestan province in northern Iran, which is characterized by unique ethnic diversity and distinct cultural norms regarding sexual health communication. To date, no study has examined this association in this region. Therefore, this study contributes new knowledge by being the first to investigate the association between sexual health literacy and sexual self-efficacy among infertile women in this understudied region, providing evidence that may inform culturally tailored educational interventions in infertility care settings. Accordingly, this study aimed to examine the relationship between sexual health literacy and sexual self-efficacy among infertile women attending a public infertility treatment center in Gorgan, Iran, in 2025-2026.

Materials and Methods

Study Design and Setting

This cross-sectional study was conducted at the infertility clinic of Shahid Sayad Shirazi Hospital, the largest public infertility referral center affiliated with Golestan University of Medical Sciences in Gorgan, Iran. Data collection was conducted from May 2025 to January 2026.

Participants, Eligibility Criteria, and Sampling Methods

A total of 186 women diagnosed with primary infertility were enrolled using a convenience sampling method. The inclusion criteria were as follows: (1) confirmed primary infertility by a gynecologist, (2) age between 20 and 40 years, and (3) basic literacy in Persian. The exclusion criteria were as follows: (1) secondary infertility or male-factor infertility as the primary diagnosis, (2) attendance for non-infertility purposes such as preimplantation genetic testing for sex selection, (3) self-reported chronic physical conditions (e.g., diabetes, hypertension, cardiac, thyroid, pulmonary, or advanced renal/neurological disorders), and (4) current use of psychotropic medications.

Data Collection and Procedure

Written informed consent was obtained from all participants before completing the self-administered questionnaires. A researcher was present to answer questions and subsequently reviewed each completed questionnaire for missing items.

Data were collected using the following three instruments.

1. **Demographic and Clinical Information Form:** This form captured data on age (both partners), educational level, occupation, household economic status, duration of marriage, duration of infertility, and access to a private bedroom.
2. **Sexual Health Literacy Questionnaire (SHLQ):** This 40-item tool, developed and validated in Persian by Masoumi et al (2019), assesses four dimensions: Access Skills (7 items), Reading and Comprehension (18 items), Analysis and Evaluation (5 items), and Application of Information (10 items). Items are rated on a 5-point Likert scale. The total score ranges from 0 to 100, with scores categorized as inadequate (0–50), borderline (51–66), adequate (66.1–84), and excellent (84.1–100). The questionnaire demonstrated strong psychometric properties, with a Content Validity Ratio (CVR) of 0.84, a Content Validity Index (CVI) of 0.81, and Cronbach's alpha coefficients ranging from 0.84 to 0.94 for the subscales.[17]
3. **Sexual Self-Efficacy Questionnaire (SSEQ):** This 10-item scale, adapted from Schwarzer's General Self-Efficacy Scale and validated in Persian by Vaziri and Lotfi Kashani (2013), measures perceived self-efficacy in sexual situations. Items are scored from 0 (not at all true) to 3 (exactly true), yielding a total score ranging from 0 to 30, which is interpreted as low (0–10), moderate (11–20), or high (21–30). The content validity of the scale was confirmed. Reliability was established with a Cronbach's alpha of 0.86, a Spearman-Brown split-half coefficient of 0.81, and a Guttman coefficient of 0.81.[18]

Sample Size

The sample size was estimated using G*Power software version 3.1.9.7. Based on the correlation ($r = 0.28$) found between sexual health literacy and marital satisfaction in a prior study by Mousazadeh et al (2024),[19] a minimum sample size of 155 participants was required ($\alpha = 0.05$, power = 80%, two-tailed). Accounting for a potential attrition rate of 20%, the final target sample size was determined to be186 participants.

Data Analysis

Data were analyzed using IBM SPSS Statistics for Windows, Version 26.0. Descriptive statistics, including mean, standard deviation, frequency, and percentage, were

used to summarize demographic characteristics and scale scores. Prior to the primary analysis, the assumptions for the Pearson correlation were examined. The normality of data distribution for both sexual health literacy and sexual self-efficacy scores was assessed using the Shapiro-Wilk test, and the results confirmed that the data were normally distributed ($P>0.05$). The assumption of linearity was also evaluated through visual inspection of scatterplots, which indicated a linear relationship between the two variables. To identify the independent predictors of sexual self-efficacy while controlling for potential confounding variables, a multiple linear regression analysis was performed using the forced entry method. The total sexual self-efficacy score was entered as the dependent variable. The following variables were simultaneously forced into the model as independent predictors: women's age, spouse's age, women's education level, spouse's education level, Body Mass Index (BMI), women's employment status, spouse's employment status, monthly household income, duration of marriage, duration of infertility, consanguineous marriage, housing status, and total sexual health literacy score. Given their ordinal nature, the multi-level categorical variables (i.e., education, employment, income, and housing) were entered into the model using their numerical rank codes. For the binary variable consanguineous marriage, the "Yes" category was designated as the reference group. Before interpreting the regression coefficients, all relevant assumptions of the model were evaluated, which included linearity (assessed via partial regression plots), independence of residuals (Durbin-Watson statistic), homoscedasticity (scatterplot of standardized residuals versus standardized predicted values), normality of residuals (Shapiro-Wilk test), and the absence of multicollinearity (Variance Inflation Factor; VIF < 10 for all predictors). All assumptions were found to be within acceptable limits. The overall significance of the regression model was assessed using the F-test, and the proportion of variance explained by the model was reported using both R^2 and adjusted R^2. For each independent variable, the unstandardized (B) and standardized (β) regression coefficients, 95% confidence intervals, standard errors, and *P*-values were reported. Then, the primary inferential analysis was performed using Pearson's correlation coefficient to examine the bivariate relationship between sexual health literacy and sexual self-efficacy. The Chi-square (χ^2) test was used to analyze associations between categorical demographic variables and the categorized levels of sexual health literacy or sexual self-efficacy. A *P*-value of less than 0.05 was considered statistically significant for all tests.

Results

This study was conducted among 186 infertile women referred to the Nahal Infertility Center of Shahid Sayad Shirazi Hospital in Gorgan, Iran. The mean age of participants was 32.86 ± 5.56 years, and that of their spouses was 36.60 ± 6.15 years. The mean duration of marriage was 8.38 ± 5.39 years, and the mean duration of infertility was 6.44 ± 4.81 years. The distribution of the qualitative variables examined is presented in Table 1.

The mean total score of sexual health literacy was 69.56 ± 23.35, which falls within the "adequate" range. The mean scores for each domain of the questionnaire are reported separately in Table 2. The mean total score of sexual self-efficacy was 18.79 ± 7.60, placing it within the "moderate" range based on the scale categorization.

Table 3 presents the distribution of sexual health literacy and sexual self-efficacy levels. Nearly half of the participants demonstrated an adequate level of sexual health literacy, while the majority reported moderate to high levels of sexual self-efficacy.

Pearson's correlation analysis revealed a strong, positive, and statistically significant correlation between the mean score of sexual self-efficacy and both the individual dimensions and the total score of sexual health literacy ($r=0.643$, $P<0.001$) (Table 4).

Additionally, the results of the Chi-square test indicated a significant association between the categorical levels of sexual health literacy and sexual self-efficacy among infertile women ($P<0.001$) (Table 5).

The multiple linear regression model significantly predicted sexual self-efficacy scores, accounting for

Table 1. Socio-demographic Characteristics of Infertile Women Attending Nahaal Infertility Center at Shahid Sayad Shirazi Hospital, Gorgan, Iran (N = 186)

Socio-demographic characteristic	Category	n	%
Women's education level	Less than diploma	36	19.4
	High school diploma	46	24.7
	Associate/Bachelor's degree	78	41.9
	Master's degree or higher	26	14.0
Women's employment status	Housewife	111	59.7
	Government employee	43	23.1
	Self-employed	29	15.6
	Other	3	1.6
Monthly household income (million Rials)*	<5	13	7.0
	5 – 10	36	19.4
	10 – 15	63	33.9
	>15	74	39.8
Access to a private bedroom	Yes	166	89.2
	No	20	10.8

Table 2. Mean Scores of Sexual Health Literacy Domains and Total Sexual Self-efficacy among Infertile Women (N = 186)

Variable/Domain	Mean	SD	Minimum	Maximum
Sexual health literacy				
Access skills	25.78	7.53	7.00	56.00
Reading and comprehension	68.62	17.24	18.00	105.00
Analysis and evaluation	17.86	5.52	5.00	25.00
Application of information	39.04	9.93	10.00	50.00
Total score	**69.56**	**23.35**	**0.00**	**100.00**
Sexual self-efficacy				
Total score	**18.79**	**7.60**	**10.00**	**30.00**

56.2% of the total variance (adjusted $R^2 = 0.562$, $F(13, 172) = 19.234$, $P < 0.001$). Among all the variables entered, the total sexual health literacy score demonstrated the strongest and most significant independent association, with a high standardized beta coefficient ($\beta = 0.752$, $P < 0.001$). In other words, higher sexual health literacy robustly predicted greater sexual self-efficacy, even after controlling for all demographic and clinical covariates. Regarding demographic variables, women's age ($\beta = -0.190$, $P = 0.012$) and spouse's age ($\beta = 0.176$, $P = 0.027$) were the only other statistically significant predictors, albeit with opposite directions, older women tended to report lower self-efficacy, while having an older spouse was linked to higher self-efficacy. However, none of the other socio-demographic variables, including education levels, employment status, household income, BMI, duration of marriage, duration of infertility, consanguineous marriage, or housing status, reached statistical significance (all $P > 0.05$). Although duration of marriage ($P = 0.067$) and duration of infertility ($P = 0.096$) approached marginal significance, they did not exceed the conventional alpha threshold (Table 6).

Table 3. Distribution of Sexual Health Literacy and Sexual Self-efficacy Levels among Infertile Women (N = 186)

Variable	Level	Score range	n	%
Sexual health literacy	Inadequate	0 - 50	31	16.7
	Borderline	50.1 - 66	31	16.7
	Adequate	66.1 - 84	76	40.9
	Excellent	84.1 - 100	48	25.8
	Total	**0 - 100**	**186**	**100.0**
Sexual self-efficacy	Low	0 - 10	27	14.5
	Moderate	10.1 - 20	80	43.0
	High	20.1 - 30	79	42.5
	Total	**0 - 30**	**186**	**100.0**

Discussion

This study was designed to assess the relationship between sexual health literacy and sexual self-efficacy among infertile women attending a public infertility treatment center in Gorgan, Iran, between 2025 and 2026. A significant positive association was found, with women who had higher sexual health literacy reporting greater

Table 4. Correlation between Sexual Health Literacy Domain Scores and Total Sexual Self-efficacy Score among Infertile Women (N = 186)

Domains of sexual health literacy	Pearson's r	*P*-value
Access skills	0.678	< 0.001
Reading and comprehension	0.708	< 0.001
Analysis and evaluation	0.643	< 0.001
Application of information	0.705	< 0.001
Total sexual health literacy score	**0.643**	**< 0.001**

Table 5. Association between Sexual Health Literacy Levels and Sexual Self-efficacy Levels among Infertile Women (N = 186)

Sexual self-efficacy level	Inadequate n (%)	Borderline n (%)	Adequate n (%)	Excellent n (%)	Total n (%)	*P*-value*
Low	21 (77.8)	3 (11.1)	2 (7.4)	1 (3.7)	27 (100)	**< 0.001**
Moderate	8 (10.0)	20 (25.0)	43 (53.8)	9 (11.2)	80 (100)	
High	2 (2.5)	8 (10.1)	31 (39.2)	38 (48.1)	79 (100)	
Total	**31 (16.7)**	**31 (16.7)**	**76 (40.9)**	**48 (25.8)**	**186 (100)**	

*Chi-square test

Table 6. Multiple Linear Regression Analysis of Factors Associated with Sexual Self-efficacy among Infertile Women (N = 186)

Variable	B (Unstandardized)	SE	β (Standardized)	t	*P*-value	95% CI for B
(Constant)	-4.401	4.011		-1.097	0.274	-12.318 to 3.516
Women's age (years)	-0.260	0.102	-0.190	-2.537	0.012	-0.462 to -0.058
Spouse's age (years)	0.217	0.098	0.176	2.223	0.027	0.024 to 0.410
Women's education level *	-0.538	0.624	-0.068	-0.862	0.390	-1.769 to 0.694
Spouse's education level *	0.283	0.581	0.038	0.487	0.627	-0.864 to 1.430
BMI	-0.093	0.083	-0.057	-1.116	0.266	-0.257 to 0.071
Women's employment status *	-0.112	0.511	-0.013	-0.219	0.827	-1.120 to 0.896
Spouse's employment status *	0.629	0.617	0.053	1.021	0.309	-0.588 to 1.846
Monthly household income *	0.725	0.584	0.089	1.241	0.216	-0.428 to 1.877
Duration of marriage (years)	-0.291	0.158	-0.206	-1.845	0.067	-0.602 to 0.020
Duration of infertility (years)	0.320	0.191	0.202	1.672	0.096	-0.058 to 0.697
Consanguineous marriage (Ref: Yes) †	0.330	0.947	0.019	0.349	0.728	-1.539 to 2.200
Housing status *	-0.103	0.331	-0.016	-0.311	0.756	-0.757 to 0.551
Total sexual health literacy score	0.153	0.012	0.752	13.041	< 0.001	0.130 to 0.176

Model Fit: $R^2 = 0.592$; Adjusted $R^2 = 0.562$; $F(13, 172) = 19.234$; $P < 0.001$
CI = Confidence Interval; Ref = Reference category.
* Variables with an asterisk were entered as ordinal numerical codes (e.g., 1 to 4 for education and income; 1 to 4 for employment and housing), treating each step up the scale as a one-unit linear increase. † For consanguineous marriage, "Yes" (coded 1) served as the baseline reference category against which "No" (coded 2) was compared.

sexual self-efficacy.

The findings indicated that the mean score of sexual health literacy among participants fell within the "adequate" range. This is consistent with the study conducted by Jamali et al (2020), reporting an adequate level of sexual health literacy among women of reproductive age.[20] In contrast, Dabiri et al (2019) found that the mean sexual health literacy score among couples about to marry was within the "not quite adequate" range.[21] In a study conducted by Mousazadeh et al (2024) in Gilan and Ardabil provinces, the mean sexual health literacy score was found to be lower in infertile women compared to their fertile counterparts, although the score of the infertile group was comparable to that observed in the present study.[19] The consistency between the findings of studies conducted by Jamali and Mousazadeh [20, 21] and the present study can be partly attributed to the similarity in the study populations (i.e., women/couples of reproductive age and infertile women). Conversely, the lower literacy score reported by Dabiri et al may stem from the unique characteristics of the target population, couples on the verge of marriage, who may have had less opportunity or motivation to acquire practical sexual health information due to a lack of shared life experience. Furthermore, the instrument used by Dabiri et al was researcher-made, differing from the validated psychometric tools employed in the studies by Jamali, Mousazadeh, and the present study.

The present study found the mean score of sexual self-efficacy among infertile women to be at a moderate level. However, examining the distribution of scores revealed that comparable proportions of participants had moderate (43%) and high (42.5%) sexual self-efficacy. Consistent with this finding, studies conducted by Banaha et al (2023) on infertile women in Babol [15] and Atrian (2019) on married women in Mashhad [6] also reported moderate mean levels of sexual self-efficacy among participants. When comparing fertile and infertile women, Alirezaei et al (2013) found that fertile women reported higher mean scores of sexual self-efficacy than their infertile counterparts.[5] This difference can be explained by the psychological consequences associated with infertility. The experience of infertility, especially in societies such as Iran that place a high value on childbearing, can lead to chronic stress, feelings of inadequacy, reduced self-esteem, and marital tension. These factors collectively increase psychological burden and can directly and negatively impact sexual self-efficacy.

Most participants' self-efficacy scores fell within the moderate to high range, which suggests that sexual self-efficacy is influenced more by a network of protective and adaptive factors than solely by fertility status. In the present sample, the relatively high level of sexual health literacy observed among most participants appears to have played an important role. Enhanced knowledge, skills, and confidence may help individuals cope with infertility-related stress, thereby preserving their sense of control and self-efficacy in the sexual domain.

The present study found a strong, positive, and statistically significant correlation between sexual health literacy and sexual self-efficacy among infertile women. A review of the existing literature revealed no studies that directly examined the relationship between these two variables, particularly in an infertile female population, underscoring the novelty of this research. The closest related studies indicate a significant association between sexual health literacy and concepts related to sexual self-efficacy. For instance, Darban et al (2025) found a direct and significant relationship between sexual health literacy and sexual self-care among women of reproductive age, which can be viewed as the behavioral manifestation of sexual self-efficacy.[22] This result is consistent with Bandura's Social Cognitive Theory, which posits that self-efficacy, defined as one's confidence in executing a particular behavior, is influenced by critical informational sources, including knowledge, the fundamental component of health literacy.[23] From this perspective, it is logical that greater sexual health literacy encompassing access to, understanding of, and application of accurate sexual information is associated with increased feelings of competence, control, and ultimately, sexual self-efficacy.[11] The results of numerous interventional studies also support this relationship. Wong et al (2021) [14] and Ghasemi et al (2024) [24] have also demonstrated that educational interventions aimed at promoting sexual health literacy led to significant improvements in sexual self-efficacy among various target groups. Furthermore, a study conducted by Banaei et al (2025) using structural equation modeling showed that sexual health literacy influences sexual function both directly and indirectly by enhancing sexual self-efficacy.[25] The broader applicability of health literacy as a determinant of psychological empowerment in sensitive reproductive periods is further supported by evidence from other domains of women's health. For instance, a study of pregnant women in eastern Iran found that mental health literacy regarding postpartum depression was at a moderate level and that lower literacy was associated with reduced awareness of health services, less favorable attitudes toward help-seeking, and significant associations with income and education.[26] This parallel underscores that, across different reproductive health contexts, health literacy functions as a foundational asset that shapes women's ability to understand, access, and benefit from health-related information, a principle equally relevant to sexual self-efficacy in infertility.

Sexual health literacy was identified as the strongest predictor of sexual self-efficacy, alone accounting for a substantial portion of the explained variance (56.2%). This result underscores that sexual knowledge and awareness, beyond demographic factors, play a pivotal role in psychologically empowering women to navigate sexual interactions.[25] Among the background variables, women's age showed a negative association and spouse's age showed a positive association with self-efficacy. The decline in self-efficacy among older women may

be attributable to age-related physiological changes, the chronic psychological strain of infertility, and more restrictive cultural norms regarding sexual expression in this age group.[27] Conversely, older spousal age appears to foster a safer environment for women's sexual assertiveness through greater emotional maturity, a deeper understanding of their partner's needs, and more effective support provision.[28] The non-significance of marriage duration and infertility duration further suggests that the quality of the couple's adjustment to their circumstances matters more than the mere passage of time.[29]

This association positions sexual self-efficacy as a key mechanism in the pathway through which health literacy exerts its influence. Although direct research on the link between these two specific variables remains limited, the findings of the present study are consistent with theoretical frameworks and supported by related interventional evidence. Taken together, these results provide a solid foundation for designing and justifying future educational interventions that simultaneously target sexual health literacy and sexual empowerment in infertile women.

Strengths and Limitations

This study has several notable strengths, including its focus on an under-researched clinical population, the concurrent examination of sexual health literacy and sexual self-efficacy, a relatively adequate sample size, strict inclusion criteria ensuring sample homogeneity, and enhanced external validity through recruitment at a public center serving a socioeconomically diverse population. However, limitations must be acknowledged. These limitations include potential non-cooperation (addressed by offering gynecological consultations and referrals), reliance on self-reported data with possible influence of psychological state (mitigated by excluding individuals with known illnesses and confirming readiness), the exclusion of illiterate participants due to the need for self-administration of sensitive questions, the use of convenience sampling from a single center which limits generalizability despite a priori power analysis, the cross-sectional design precluding causal inferences, and possible social desirability bias. Additionally, the regression model did not adjust for several relevant psychosocial and clinical factors (depression, anxiety, marital satisfaction, infertility etiology, treatment type), limiting the completeness of the analysis. These unmeasured variables may act as confounders or mediators, necessitating cautious interpretation and highlighting the need for future longitudinal studies incorporating these comprehensive measures.

Conclusion

This study revealed a strong, positive, and significant correlation between sexual health literacy and sexual self-efficacy among infertile women attending the Sayad Shirazi treatment center in Gorgan, Iran. The findings indicate that higher levels of sexual health literacy were associated with greater sexual self-efficacy in this population. These results suggest that health policymakers and infertility care providers should consider integrating sexual health education programs into routine infertility care, as such initiatives may help address the sexual health information needs of infertile women in a culturally appropriate manner. Establishing dedicated sexual health counseling services within infertility treatment centers and training healthcare providers to effectively communicate sexual health information could further support patients in building sexual self-efficacy. Future longitudinal and interventional studies are warranted to evaluate the effectiveness of such strategies in improving both sexual health literacy and sexual self-efficacy in this population.

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Artificial Intelligence Disclosure

During the preparation of this manuscript, the authors employed DeepSeek for language editing, grammatical editing, and translation from Persian into English. All content generated with the assistance of these tools was carefully reviewed, validated, and revised by the author(s) to ensure accuracy, originality, and scholarly rigor. The authors assume full responsibility for the integrity and final content of the published articles.

Authors' Contribution

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Competing Interests

The authors declare no competing interests.

Ethical Approval

This study was approved by the Ethics Committee of Golestan University of Medical Sciences (IR.GOUMS.REC.1404.018). The study was also conducted in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from all individual participants included in the study.

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