The relationship between iron deficiency anemia and sexual function and satisfaction among reproductive-aged Iranian women

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Abstract

Iron deficiency anemia (IDA) is a common micronutrient deficiency worldwide, and an important health problem especially in women of reproductive age. This study aimed to determine the relationship between IDA and sexual satisfaction and function among reproductive-aged Iranian women. In this study, 129 women (52 with IDA and 77 non-IDA) with age 18–45 in Mahshahr, Iran were recruited. Data was gathered by a demographic questionnaire, Female Sexual Function Index (FSFI) and Larson Sexual Satisfaction Questionnaire. Data were analyzed using an independent t-test, Mann-Whitney test, Chi-square, and correlation coefficient test. The results of this study showed that the means of hemoglobin (Hb), hematocrit (HCT), serum iron and ferritin were significantly lower in the IDA group than those in the non-IDA group (p<0.01). All dimensions of sexual function and satisfaction were significantly lower in women with IDA compared to the healthy women (p<0.001). Also, all blood indices for IDA had a significant relationship with all sexual function components and sexual satisfaction (p = 0.01) except for pain with Hb and ferritin. Health care providers should provide screening, education, and counseling about anemia and sexual function in reproductive age women.

Introduction

Sexual dysfunction is defined as a disorder in the sexual response cycle or pain during sexual intercourse [1]. Almost 40–45% of women suffer from sexual dysfunction [2]. The prevalence of sexual dysfunction reported to be 43% and 31% among women and men in the United States respectively [3]. According to a national survey conducted in Iran, 31.5% of women had sexual dysfunction [4].

Female sexual dysfunction can affect the general health and quality of life [5]. Several factors can cause sexual dysfunction in women, including general health status, psychological

disorders, chronic diseases, individual and social factors [6]. Also, other factors such as urinary incontinence [7], metabolic syndrome [8], chronic renal failure [9], substance abuse [10], and some behavioral disorders [11] may affect sexual function in women.

Iron deficiency anemia is one of the most common forms of malnutrition. Thirty to fifty percent of worldwide anemia is attributed to iron deficiency [12]. Almost 1.6 billion people globally are suffering from anemia most of whom have iron deficiency anemia [13]. The prevalence of anemia among women in Turkey is 27.8% that 56% of them have iron deficiency anemia (IDA) [14]. According to a study among women aged 15–45 in Zanjan, Iran, 23.6% of women had anemia [15]. IDA causes symptoms such as weakness, headache, restlessness, fatigue, anxiety, pallor, palpitation, reduced strength, impair learning and productivity, and reduced physical and mental capacity [16–17]as well as fatigue, poor mental health, lack of concentration and poor pregnancy outcomes [18]. Since IDA can cause anxiety and fatigue in women, and these can, in turn, be effective factors in sexual function, the IDA could be considered as a factor to reduce sexual function. [18–19].

A study by Gulmez et al. [20] showed that after treatment of IDA in women, most of the sexual function domains were significantly enhanced. Also, studies showed that with increasing serum hemoglobin level, sexual performance score, level of energy, physical and social function increased, and anxiety and depression score decreased, that all of these factors are related to better sexual function [21–22].

In contrast, there are other studies that have reached contradictory results. The results of a study showed that Hb levels in women with and without sexual dysfunction were not significantly different [23]. Also studies showed that women with hypothyroidism have a lower sexual function in comparison to normal women [24–25].

Given the paucity of studies on the era, the hypothesis of the study was: is there a relationship between iron deficiency anemia and sexual function and satisfaction among reproductive-aged women in Iran.

Materials and methods

This study is a matched cohort study to determine the association of IDA with sexual satisfaction and function in 129 women (52 with IDA and 77 non-IDA) of reproductive age in Mahshar, Iran. Eligible women were recruited from a public health clinic in Mahshar from September to June 2017.

The inclusion criteria were as follows: age 18–45 years, married for more than one year, sexually active, having basic literacy, and being monogamous. Women with chronic diseases, pregnancy, breastfeeding, early menopause, mental illness and depression or infertility, drug addiction, alcohol consumption or smoking and use of medications that had an effect on sexual function were excluded from the study.

Based on a pilot study to detect a 12-point difference at the primary outcome (the sexual satisfaction) with 12, 27.12 as respectively standard deviations of IDA and non-IDA and 5% level of significance and 90% power and 10% non- responsiveness, it was estimated that 52 participants would be necessary for each group.

To select the subjects, the researcher (ZN) attended to one public health clinic in Mahshar and explained the aims of the study to the eligible women and asked those who were willing to participate to complete the questionnaires.

Measurements

A socio-demographic questionnaire was used to gather information regarding the demographic characteristics of the participants.

Female Sexual Functions Index (FSFI) was used to gather data regarding sexual function. The FSFI consists of 19 questions (rated from 0 to 5) and 6 domains, including desire, arousal, lubrication, orgasm, satisfaction, and pain. In order to calculate the individual domain score, the scores of individual questions comprising the domain were summed and multiplied by the factor specific to the relevant domain. The total score is calculated by adding the scores of the six domains. The total score of the scale ranges from 2 to 36 with higher scores indicating a better degree of sexual function. The validity and reliability of the original and the Persian versions of this questionnaire have been assessed and confirmed by Rosen et al. [26] and Fakhri et al. [27] respectively.

The level of sexual satisfaction was measured using Larson Sexual Satisfaction (LSS). LSS has 25 questions scored from one to five according to the Likert Scale. Score one represents *never* and five represents *always*. Sexual satisfaction was classified into four sections of sexual dissatisfaction (≤ 50), low sexual satisfaction (51–75), average sexual satisfaction (76–100), and high sexual satisfaction (> 101). The validity and reliability of the original and the Persian versions of LSS have been approved by Larson et al. [28] and Bahrami et al. [29] respectively.

For measuring the hematologic status of participants, 5 mL venous blood was taken [15]. Two milliliters of blood was mixed with citrate for measuring Hb, and HCT, while three ml was used to separate the sera. The blood and sera were sent to a reference laboratory in the hospital for measuring blood indices including hemoglobin, hematocrit, serum iron, and ferritin. In this study, serum ferritin level was measured using ELISA method.

In this study, 175 women were screened according to the inclusion and exclusion criteria and 156 women had inclusion criteria. According to the results of blood tests, 52 women had IDA and matched with 77 women in the non-IDA group in terms of age, education level and contraceptive methods (Fig 1). Participants in the case and control groups were requested to complete a socio-demographic questionnaire, FSFI and LSS questionnaires. One of the researchers (ZN) was available to resolve any ambiguity.

Ethical consideration. The design of the study was approved by the Ethics Committee of Ahvaz Jundishapur University of Medical Sciences (Ref No: IR.AJUMS.REC.1395.219). All participants gave written informed consent prior to data collection.

Statistical analysis

Statistical analysis was carried out using SPSS version 19. Quantitative data were computed as means and standard deviations (SD), and qualitative data were presented as frequencies and percentages. Based on normality, the data distribution was analyzed using an independent t-test or Mann-Whitney tests. The Chi-square test was used to compare qualitative variables between the two groups. In this study, the assumptions of Pearson correlation did not meet, so non-parametric correlation coefficient was used to test the relationship between blood indices and sexual function and satisfaction. P values less than 0.05 were considered significant.

Results and discussion

A total of 156 women were recruited for this study and 129 completed the study. The flowchart of recruitment and retention of participants is presented in Fig 1.

The socio-demographic characteristics of participants are presented in Table 1. There was no significant difference between the two groups in any of the baseline characteristics.

Most women in the two groups had one or two children. Most women in both groups had regular menstrual cycles. There was no significant difference between the groups in terms of reproductive characteristics (Table 1).
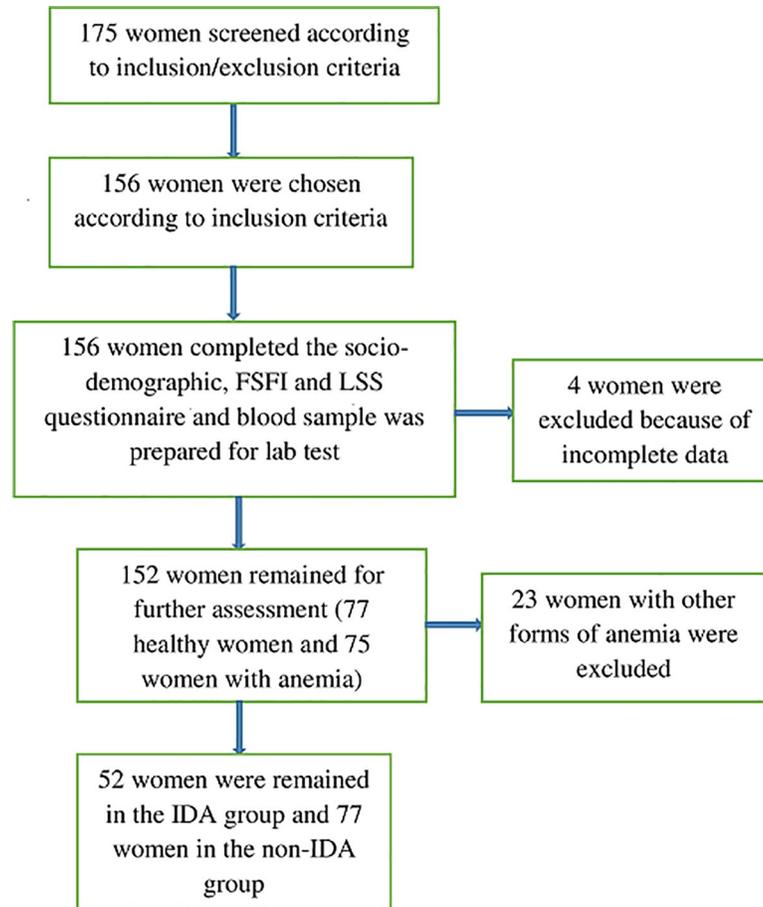
Fig 1. Flowchart of recruitment and retention of participants in the study.

The means of Hb, HCT, serum iron and ferritin in the IDA group was significantly lower than those in the non-IDA group (p<0.01, Table 2). The scores of desire, arousal, lubrication, orgasms, and satisfaction were significantly lower in women with anemia compared to the normal women (p<0.001). Also, the IDA group had significantly more pain than that in the non-IDA group (3.48 ±1.50 vs. 4.29 ±1.25, p<0.001). The total score of sexual function and sexual satisfaction in the IDA group was significantly lower than that in the non-IDA group (19.76 ±5.40 vs. 26.76 ±3.91, p<0.001) and (85.28± 20.24 vs. 99.16 ±16.73, p<0.001) respectively (Table 3).

As evident in Table 4, all blood indices for IDA had a significant relationship with all sexual function components and sexual satisfaction (p = 0.01) except for pain with HB and ferritin.

This study aimed to evaluate the relationship between iron deficiency anemia and sexual function and satisfaction among reproductive-aged Iranian women. Our results showed that women with iron deficiency anemia had lower scores of sexual function and satisfaction.

Iron deficiency anemia is the most common type of anemia and is a public health problem that affects populations in both rich and poor countries. Because of the high demand for iron during a pregnancy, lactation, menstruation, and nutritional deficiencies, IDA remained the most common cause of iron deficiency in reproductive age women. According to the WHO, the global prevalence of anemia is 24.8% that is about 1.62 billion people worldwide. However, among different population groups, the greatest number of individuals (468.4 million) affected

Table 1. Socio-demographic and reproductive characteristic of the responders.

Characteristic		IDA group (n = 52)	Non-IDA group (n = 77)	P-value
		Mean ±SD or N (%)		
Marriage duration (y)*		12.26 ±6.42	10.68 ±6.02	0.36
Age (y)*		33.23±5.25	32.33±5.2	0.52
Spouse's Age (y)*		38.07±6.85	37.67±5.7	0.93
Educational level	Elementary	10 (19.2)	10 (13)	0.64
	Secondary	11 (21.2)	19 (24.7)	
	Diploma	21 (40.4)	28 (36.4)	
	Academic	10 (19.2)	20 (27)	
Spouse's Education	Elementary	8 (15.4)	13 (16.9)	0.93
	Guidance	16 (30.8)	21 (27.3)	
	Diploma	18 (34.6)	25 (32. 5)	
	College	10 (19.3)	18 (23.4)	
Job	Housewife	48 (92.3)	63 (81.8)	0.92
	Employed	4 (7.7)	14(18.2)	
Spouse's job	Self- Employment	25 (48.1)	45 (58.4)	0.31
	Employed	23 (44.2)	29 (37.7)	
	Unemployed	4 (7.7)	3 (3.9)	
Economic status	Good	4 (7.7)	12 (56.4)	0.36
	Moderate	39 (75)	55 (71.4)	
	Poor	9 (17.3)	10 (13)	
Number of children*		2.11±1.21	1.84±1.06	0.17
Type of previous delivery	NVD	22 (42.3)	40 (51.9)	0.34
	C/S	25 (48.0)	34 (44.1)	
	NVD+C/S	1 (1.9)	0 (0)	
	Nulliparous	4 (7.6)	3 (3.8)	
Contraception	OCP	8 (15.4)	14 (18.2)	0.92
	Condom	13 (25)	19 (24.7)	
	IUD	5 (9.6)	11 (14.3)	
	TL	2 (3.8)	2 (2.6)	
	Withdrawal	22 (42.3)	27 (35.1)	
	No methods	2 (3.8)	4 (5.2)	
Menstruation	Regular	41 (78.8)	65 (84.4)	0.92
	Irregular	11 (21.2)	12 (15.6)	

* Mean (SD); the data are given as N (%), C/s: Cesarean section, NVD: Normal Vaginal Delivery, OCP: Oral

Contraceptive pills, IUD: Intra Uterine Device, TL: Tubal Ligation

by anemia belongs to non-pregnant women [30–31]. A study showed that the prevalence of anemia and IDA was 33% and 16.6%, respectively, for reproductive age women in urban and rural areas of Iran [32].

The evidence indicated that anemia is one of the important factors related to mental well-being and quality of life [17], however, scant data regarding the impact of anemia on sexual function and satisfaction is available.

The results of this study indicated that all areas of sexual function were significantly impaired in anemic women. Results of other studies also indicated an impaired sexual function in women with iron deficiency anemia. A prospective study was conducted by Gulmez et al.,

Table 2. Comparison of mean and standard deviation of blood indices in IDA and non-IDA groups.

Variable	IDA group (n = 52)	Non-IDA group (n = 77)	Confidence interval (95%)	P-value
	Mean ± SD			
Hb (g/dL)	10.84 ±0.65	12.66 ±0.43	1.62–2	<0.001
HCT(%)	34.50 ±1.57	38.22 ±1.04	3.26–4.17	<0.001
Serum iron (μg/dL)	22.04 ±6.20	75.94 ±30.01	45.4–62.34	<0.001
Ferritin (μg/L)	10.23 ±7.53	61.24 ±87.08	26.7–75.23	<0.001

95% CI is about around the mean difference

[20] in Turkey which aimed to assess sexual performance and quality of life in women with iron deficiency anemia before and after treatment. There was a significant difference between pre- and post-treatment in level of hemoglobin, hematocrit, serum iron, and serum iron-binding capacity. Beck Anxiety Inventory (BAI) scores decreased and FSFI scores significantly increased after IDA treatments (P< 0.001). Our results in terms of the relationship between IDA and sexual function are similar to Gulmez et al.

The underlying cause of female sexual dysfunction in women with IDA is not fully understood. However, some studies revealed that women with IDA have more hypothyroidism [33] and hypothyroidism, in turn, can deteriorate the sexual function. Results of Pasquali et al.'s study showed that the prevalence of female sexual dysfunction in women with hypothyroidism was 46.1% in comparison with 20.7% in the control group [25]. Furthermore, depression and anxiety are both contributed to sexual function may happen more in the basis of IDA and a study showed that with the treatment of IDA the scores of depression decreased and sexual function also improved significantly [20].

Beside thyroid gland, another underlying cause for sexual dysfunction among women with IDA is a decrease of sex hormones. A cross-sectional study with the aim of determining the relationship between serum ferritin and sexual hormones by Liu et al., was done in China [34]. Results showed that ferritin level had a significant and an inverse relationship with total serum testosterone, sex hormone-binding protein (SHBG) and free testosterone. However, there was only a slight non-significant negative correlation between ferritin and estradiol levels.

Table 3. Sexual function and satisfaction scores in IDA and non-IDA groups.

Sexual function	IDA group (n = 52)	Non-IDA group (n = 77)	P-value
	Mean ±SD or N(%)		
Desire	2.57 ±0.97	3.64 ±0.85	<0.001
Arousal	2.87 ±1.07	4.06 ±0.89	<0.001
Lubrication	3.64 ±1.38	4.80 ±0.87	<0.001
Orgasm	3.33 ±1.57	4.91 ±0.97	<0.001
Satisfaction	3.72 ±1.28	5.04 ±0.97	<0.001
Pain	3.48 ±1.50	4.29 ±1.25	<0.001
Total Sexual function	19.76 ±5.40	26.76 ±3.91	<0.001
Larsson Sexual Satisfaction, mean ±SD	85.28± 20.24	99.16 ±16.73	<0.001
Dissatisfaction with sex (0–50)	2 (3.84)	1 (1.29)	<0.001
Low sexual satisfaction (51–75)	11 (21.15)	4 (5.19)	
Medium sexual satisfaction (76–100)	30 (57.6)	28 (36.3)	
High sexual satisfaction (Score > 100)	9 (17.3)	44 (57.14)	

Table 4. The relationship of sexual function components with blood indices for IDA.

Blood indices	Desire	Arousal	Lubrication	Orgasm	Sexual Satisfaction	Pain	LSS score	Total score of FSFI
HB (g/dl)	0.42**	0.46**	0.36**	0.48**	0.43**	0.15	0.33**	0.55**
HCT (%)	0.41**	0.40**	0.38**	0.42**	0.42**	0.16**	0.35**	0.47**
Ferritin (µg/L)	0.41**	0.50**	0.32**	0.43**	0.47**	0.12	0.34**	0.52**
Serum iron (µg/dL)	0.48**	0.49**	0.34**	0.42**	0.46**	0.26**	0.38**	0.53**

** Significant at 0.01

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Some studies have shown that low testosterone levels are associated with low hemoglobin levels, and testosterone deficiency can reduce sexual desire and satisfaction. Also, there is some evidence that testosterone supplementation can normalize the iron status and improve the anemia in older mice [35]. Ekart et al. in their study on hemodialysis patients, found a correlation between serum testosterone concentration and hemoglobin [36]. Some previous studies showed an association between testosterone levels and hemoglobin in non-hemodialysis patients. Bhatia et al. demonstrated that both low testosterone and chronic inflammation contributed to mild anemia in type-2 diabetic men [37]. Gebremedhin & Enquselassie found that testosterone deficiency contributed to an increased frequency of anemia in men with type-2 diabetes mellitus [31].

Our results indicated that all blood indices for IDA had a significant relationship with all sexual function dimensions and sexual satisfaction except for pain that did not show any significant relationship with HB and ferritin. We could not find any study that evaluates the relationship of blood indices in IDA and sexual function. However, Teuwafeu et al., in their study on women who underwent maintenance hemodialysis found that there is a significant relationship between anemia and sexual function [38].

Strengths and limitations of the study

To the best of our knowledge, this is the first study examining the relationship between iron deficiency anemia with sexual satisfaction and function in women of reproductive age. Women enrolled from a public health center that this center providing care for the whole population and not just the sick people.

This study has some limitations that are worth mentioning. First, this study was done on only women in the south of Iran; therefore, the findings cannot be applied to other women or girls in Iran. Another limitation of the study is using self-reporting questionnaires. In this study, we did not assess the sexual function of male partners; therefore, further study in men could provide comprehensive information in this area.

Conclusion

The results of this study showed that the score of all dimensions of sexual function in anemic women is lower than that in healthy women. Therefore, screening, education, and counseling about anemia and sexual function among anemic women in reproductive age are recommended. Also, it is recommended that iron deficiency anemia should be considered as an effective factor in treating a patient with sexual dysfunction and sexual dissatisfaction.

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Author Contributions

Conceptualization: Zahra Nikzad, Mina Iravani, Parvin Abedi, Nahid Shahbazian.

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Formal analysis: Amal Saki.

Funding acquisition: Mina Iravani.

Methodology: Mina Iravani, Parvin Abedi.

Software: Amal Saki.

Supervision: Parvin Abedi, Nahid Shahbazian.

Writing – original draft: Zahra Nikzad.

Writing – review & editing: Parvin Abedi.

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