

Relationship between Hope and Stress with Reproductive Outcome in Women Undergoing *In Vitro* Fertilization Treatment: A Cross-sectional Study

Sedigheh Pakseresht¹, Mahsa Salimi Kivi², Morvarid Ghassab Shirazi³, Zahra Atrkar Roshan⁴

ABSTRACT

Background: Infertility has many psychological effects on infertile couples' mental health. Stress and hopelessness are the most important factors that may affect the success of *in vitro* fertilization (IVF) in these couples. This study is aimed at investigating the relationship between stress and hope with reproductive outcomes in women undergoing IVF treatment.

Materials and methods: In this cross-sectional study, 186 women who were referred to infertility centers in Rasht undergoing IVF were selected by convenience sampling between May and October 2019. Data collection tools included a demographic questionnaire, Standard Newton's Infertility Stress, and Snyder hope scale was used to measure infertility stress and hope. β -subunit of human chorionic gonadotropin was measured in relation to reproductive outcome 14–16 days after IVF.

Results: The mean age of participants was 33.24 ± 6.23 years. The main causes of infertility were females (41.4%), males (21%), females and males (23.7%), and unknown (14%). Pregnancy success after IVF was 35.5%. The results revealed that the total stress score was 161.06 ± 29.001 , and the mean score of hope was 51.39 ± 7.47 . According to the results of logistic regression, there was a significant relationship between age and reproductive outcomes ($p = 0.036$). However, there was no significant relationship between study concepts and reproductive outcomes after IVF.

Conclusion: According to the findings of the present study, stress and hope were not significantly correlated with the success of IVF; although the level of hope in this study was good, stress is high in these individuals.

Keywords: Hope, Infertility, *In vitro* fertilization, Stress.

International Journal of Infertility and Fetal Medicine (2022): 10.5005/jp-journals-10016-1282

INTRODUCTION

Infertility is defined as a lack of fertility after one year of continuous sexual activity without the use of any prevention methods.¹ Almost 10–15% of couples worldwide have infertility problems.² A population-based study in Iran shows that the overall prevalence of primary infertility in Iranian couples is 17.3%,³ more than the average global statistics.

Advances in assisted reproductive technology (ART) have created great hope for treatment in infertile couples.⁴ ART consists of procedures involving the *in vitro* handling of both human oocytes and sperm or embryos to establish a pregnancy, but IVF is a relatively new technology.⁵ It is one of the most successful options, boasting a success rate of about 31–46% per cycle, usually the last treatment for infertile couples.⁶

Studies confirm that psychological factors are related to IVF treatment outcomes.^{7,8} The overall prevalence of psychological problems in infertile couples is estimated to be 26–54%.⁹ Hopelessness is one of the main consequences of infertility.¹⁰ Hope is essential for having a child because hope is one of the basic psychological needs, and achieving a goal is impossible without hope; in other words, hope helps build confidence and a positive inner feeling to solve the problem.¹¹ Stress is another important common factor in infertile women,¹² and women describe infertility as the most stressful event in their lives.¹³ Reproductive aids are one of the most expensive and aggressive infertility treatments, and research has indicated that the more stress women have at the start of these treatments, the higher their rates of abandonment.¹⁴

¹Department of Obstetrics, Community Health, Women Health Promotion, Social Determinants of Health Research Center (SDHRC), Reproductive Health Research Center, Shahid Beheshti Nursing and Midwifery School, Guilan University of Medical Sciences, Rasht, Iran

²Department of Midwifery, Shahid Beheshti Nursing and Midwifery School, Guilan University of Medical Sciences, Rasht, Iran

³Department of Midwifery, Zeynab School of Nursing and Midwifery, Guilan University of Medical Sciences, Rasht, Iran

⁴Department of Biostatistics, School of Medicine, Guilan University of Medical Sciences, Rasht, Iran

Corresponding Author: Mahsa Salimi Kivi, Department of Midwifery, Shahid Beheshti Nursing and Midwifery School, Guilan University of Medical Sciences, Rasht, Iran, Phone: +989118327562, e-mail: salimimahsa603@yahoo.com

How to cite this article: Pakseresht S, Salimi Kivi M, Ghassab Shirazi M, *et al.* Relationship between Hope and Stress with Reproductive Outcome in Women Undergoing *In Vitro* Fertilization Treatment: A Cross-sectional Study. *Int J Infertil Fetal Med* 2022;13(2):56–60.

Source of support: Nil

Conflict of interest: None

Despite the large number of studies conducted to examine the effect of psychological factors on pregnancy outcomes in infertile women, still little is known about changes in the emotional experience of these women before and after IVF. It is often considered the last treatment for infertility, but women treated with this method usually have high levels of stress that may even

disrupt the treatment process.¹⁵ In contrast, a meta-analysis study showed no statistically significant association between emotional distress and the pregnancy outcome.^{16,17} By identifying these factors to alleviate these disorders, reduce stress, increase the hope of these mothers, and thus improve their pregnancy outcomes, it is expected to take an effective step. Therefore, the present study was designed to determine the relationship between hope and stress with reproductive outcomes in women undergoing IVF treatment.

MATERIALS AND METHODS

One hundred eighty-six infertile women referred to only the educational, research, and medical center of Al-Zahra Hospital in Rasht and Mehr infertility institute center from May to October 2019 participated in this cross-sectional study. To estimate the sample size, a pilot study was conducted on 32 infertile women referred to Al-Zahra Hospital Infertility Clinic, and the total number of participants was obtained using the sample size formula with 95% confidence and 80% power. Considering that the average number of patients referred to Al-Zahra Hospital Infertility Clinic during 1 month was 60 and Mehr Infertility Institute was 100, the number of patients referred to Al-Zahra Hospital Infertility Clinic was calculated to be 70 and Mehr Institute to be 116 selected by gradual and available sampling method.

Inclusion criteria were women with primary infertility, unborn child, definitive diagnosis of female infertility by a gynecologist based on documentation (ultrasound, blood test, and hysterosalpingography), IVF candidates, ability to communicate and answer questions, and no history of mental illness based on infertility centers health files like depression, anxiety disorders, schizophrenia, eating disorders, intellectual disabilities, and disorders due to drug abuse. Exclusion criteria were noncompletion of the questionnaire.

Participants provided demographic/clinical information, including age, occupation, monthly income, women's education, spouses' education, duration of the marriage, and duration of infertility.

The second part was the adult hope scale published in 1991 by Snyder et al.¹⁸ his item self-report tool is divided into two subscales: Agency and Pathways. There are four questions for the sense of personal agency related to goal attainment^{2,9,10,12} and four questions for the ability to recognize/generate pathways to reach a goal.^{1,4,6,8} Four questions^{3,5,7,11} are not counted in the scoring. Each question is scored on an eight-item Likert scale strongly disagree (score 1) to strongly agree (score 8). The total score of hope is between 8 and 64; in which a higher score indicates a higher level of hope. We have used the Persian version of hope demonstrating strong internal consistency ($\alpha = 0.86$) in the current sample validated by Kermani et al.¹⁷

The third part was the standard infertility stress tool made by Newton in 1999.¹⁹ The questionnaire included 46 questions and 5 subscales (Social concerns, Sexual concerns, Relationship concerns, Rejection of childfree lifestyle, and Need for parenthood). Six-item Likert scale questions ranged from strongly disagree to

strongly disagree, that is 1 (strongly disagree) to 6 (totally agree). High-stress scores indicate more stress in infertility. In the tool, 17 questions scores inversely, the subscales score by summing the raw scores of the questions for each subscale. The total stress score ranges from 46 to 276. The higher numerical values represent higher levels of stress. In this study, the infertility related-stress of the participants was measured by the Persian version of FPI.²⁰ Cronbach's alpha coefficient of FPI was 0.93 in this study.

First, the researcher introduced oneself to participants, informed them of the purpose of the study, and ensured confidentiality. They completed the questionnaires after signing the written consent form; they could be excluded from the study at any time.

β -subunit of human chorionic gonadotropin (β -hCG) was measured for reproductive outcome 14–16 days after IVF, and a total of 200 questionnaires were returned. Follow-up was done by cell phone contact with them; 14 participants were excluded due to incomplete filling of questions⁴ and were unavailable by cell phone.¹⁰ Finally, 186 questionnaires were statistically analyzed.

Statistical Analysis

Data were analyzed using SPSS software version 22.0 (version 22.0, IBM Corporation, Armonk, NY, USA). The results of quantitative variables and categorical variables were reported as mean \pm standard deviations (SD) and frequency (percentage), respectively. To find out the relationship between research variables such as stress, hope, and reproductive outcomes *t*-test and regression models were used. $p < 0.05$ was considered significant.

RESULTS

In the present study, 186 infertile women were investigated. The results showed that 60.2% of the high school were graduates, 79.6% were housewives, 73.2% of their spouses were freelance, 88.7% of the people had incomes of 2–3 million Tomans, and 69.9% were rural.

The results showed that 21% of the causes of infertility were male, 41.4% were female, 23.7% were male and female, and 14% were unknown infertile. Examination of the frequency distribution of successful IVF in infertile women revealed that 35.5% of treatment results were successful, and 64.5% were unsuccessful. The mean age of the subjects was 33.24 ± 6.23 , and the duration of infertility was 6.44 ± 4.78 (Table 1).

The examination of the hope score and its subscales in infertile women showed that the total hope score was 51.39 ± 7.47 (Table 2). Moreover, an examination of infertility-related stress scores and their subscales in infertile women showed the total stress score was 161.06 ± 29.001 (Table 3).

Based on the results of this analysis, there was a significant negative association between the age with pregnancy outcomes of IVF ($p = 0.036$). There was no significant relationship between study concepts (hope and stress) and reproductive outcomes after IVF (Table 4).

Table 1: Mean score of some demographic variables in study subjects (186 persons)

Variables	Mean \pm Standard deviation	Median	Minimum	Maximum
Age (years)	33.24 \pm 6.23	33	20	49
Duration of marriage (years)	7.95 \pm 4.89	7	1	17
The duration of infertility (years)	6.44 \pm 4.78	5	1	17
Duration of treatment (years)	4.45 \pm 4.17	3	1	17

DISCUSSION

The results of this study revealed that 35.5% were successful (positive pregnancy) treatment. The mean score of hope in this study was 51.39 ± 7.47 . In a similar study, the mean score of hope in women was 51.17 ± 7.17 .²⁰ Hope is one of the important psychological factors to cope with various diseases.²¹ In the study by Ali, 52.35% had high hope scores, 43.53% had moderate hope, and 4.12% had low hope scores.²² Many infertile couples have many psychological

problems.²³ Hope is an important factor in accepting conditions in infertile people and helping them adapt to their infertility.¹¹ Hope is an important factor in coping and reducing stress in infertile women. There was a significant relationship between hope score and adaptation power so that more consistency was found in hopeful women.²² Furthermore, there was a significant relationship between hope and satisfaction and psychological well-being.²⁴ In addition, Mosalanejad showed a significant relationship between adaptation power and hope score.²³

The results of this study showed no significant relationship between the study concept's total hope score and reproductive outcome after IVF. Our findings are in line with similar studies; in the discussion of the factors affecting the reproductive outcome after IVF, the results of various studies are inconsistent.²⁰ Hope in infertile women is expected to play an important role in decreasing stressors such as anxiety and stress and enhancing the success of IVF not shown in these studies, perhaps requiring further studies in other populations and large numbers.

Table 2: Determination of hope score and its subscales in infertile women referred to infertility centers in Rasht

Hope score	Mean ± Standard deviation
Hope total score (0–64)	51.39 ± 7.47
Agency score (4–16)	25.62 ± 4.21
Pathways score (4–16)	25.75 ± 3.97

Table 3: Evaluation of stress score related to infertility and its components in infertile women referred to infertility centers in Rasht

Stress	Minimum	Maximum	Mean ± Standard deviation	Skewness	Kurtosis
Total score (46–276)	74	229	161.06 ± 29.001	-0.263	-0.026
Social concern score (10–60)	13	51	30.69 ± 7.58	0.028	-0.336
Sexual concern score (8–48)	8	40	23.62 ± 8.65	0.046	-1.044
Relationship concern score (10–60)	10	53	30.93 ± 9.24	0.109	-0.685
Rejection of childfree lifestyle score (8–48)	13	46	30.09 ± 7.84	-0.109	-0.760
Need for parenthood score (10–60)	19	60	45.73 ± 9.95	-0.538	-0.359

Table 4: The results of logistic regression analysis of the variables with the success of IVF

Variables	p-value	SE	Wald	df	B	Exp (B)
Constant	0.451	2.721	0.569	1	2.052	7.783
Age	0.036*	0.030	4.421	1	-0.063	0.939
College education	0.083	0.693	3.015	1	-1.203	0.300
Job	0.056	1.243	3.639	1	-2.371	0.093
Husband's job	0.408	1.038	0.685	1	0.859	2.360
The economic situation	0.623	0.621	0.228	1	-0.297	0.743
Economic situation	0.667	0.425	0.185	1	0.182	1.200
Location	0.064	0.574	3.437	1	-1.064	0.126
Housing situation	0.259	0.898	1.274	1	-1.013	0.363
Cause of infertility	0.997	0.685	0.000	1	-0.002	0.998
Duration of marriage	0.275	0.123	1.194	1	-0.134	0.874
The duration of infertility	0.1	0.113	2.705	1	-0.186	0.830
Duration of treatment	0.902	0.066	0.015	1	0.008	0.992
Pathways	0.857	0.058	0.033	1	0.010	1.011
Agency	0.644	0.061	0.214	1	0.028	1.028
Social concern	0.921	0.026	0.010	1	0.003	1.003
Sexual concern	0.569	0.032	0.324	1	0.018	1.018
Relationship concern	0.169	0.029	1.891	1	-0.040	0.961
Rejection of childfree lifestyle	0.128	0.025	2.321	1	-0.038	0.962
Need for parenthood	0.422	0.021	0.643	1	0.017	1.017

Logistic regression; *p < 0.05



The results of this study showed that the total stress score was 161.06 ± 29.001 . The results of the study by Amini et al. indicated the mean score in the dimensions of social concerns equal to 30.52 ± 9.98 , 22.65 ± 7.58 for sexual concerns, 24.68 ± 6.97 for relationship concerns, 26.71 ± 7.23 for rejection of childfree lifestyle, 42.10 ± 8.82 need for parenthood, and total stress score was 146.55 ± 31.71 .²⁵ Li et al. study results showed total stress score was 145.57 ± 24.33 ,²⁶ less than the overall stress score and its dimensions in the present study. It seems that people with better control over their lives and who believe that they can succeed with perseverance, effort, and overcoming stress in different arenas of life will have a better situation, which in this study may be due to higher stress. Examples include poor economic conditions, poor living conditions, and poor education. Many other factors reduce stress, such as planning for the future, maintaining a relationship, living with love, having high self-esteem, and cultural and religious characteristics influence the results of different studies.²⁶

According to the findings of the present study, the overall stress score and its subscales were not significantly correlated with pregnancy success. In this regard, the results of the study by Pasch showed that stress did not affect pregnancy outcomes.²³ One study found that psychological status, including stress, anxiety, and depression, did not affect their pregnancy.²⁷ While various studies by Terzioğlu et al. have shown that stress and anxiety before and during infertility treatment may affect fertility rates.²⁸ There are several reasons for the differences in study results; study participants may not report their discomfort when completing the questionnaire. In the study by Miller et al., consistent with the findings of the present study, no significant relationship was found between stress and IVF treatment.²⁹ The results of the study by Samani et al. revealed that high levels of stress are associated with failure to conceive with IVF.³⁰ Moreover, a meta-analysis study showed that stress treatment before infertility treatment had no effect on the outcome of treatment with assisted reproductive techniques.¹⁶ Many studies have investigated the effects of psychological factors on infertility treatment, but their results are inconsistent, with some studies addressing the impact of stress on reducing reproductive outcomes,²⁹ and in some studies, no effect is indicated.³¹

According to the results of logistic regression analysis among demographic variables, there was a statistically significant relationship between age and success with IVF, one of the reasons for the high success of infertility treatment. The results of the study by Pedro et al. showed that women's age was one of the factors influencing the success of IVF,³² while the results of the study by Maroufizadeh et al. indicated that age, duration of infertility, and cause of infertility had no significant relationship with the success rate of assisted reproductive methods. Older women and those with more than one problem had lower fertility rates than other groups. The physiological origin can be explained by the reason.³³

Regression results showed no significant relationship between stress and hope with successful IVF. The results of other similar studies showed no significant relationship between stress, anxiety, and depression with the success rate of IVF.^{12,20}

CONCLUSION

Although in this study, the level of hope and stress scores were in good condition, stress was high in these subjects, which should be considered by the health care professional. The role of therapists or midwives in couples' psycho-education during IVF may also be important. Hope in infertile women seems to play a significant

role in reducing stressors like anxiety and stress, and therefore psychological support, such as hope therapy, is suggested in infertile couples undergoing treatment to improve their health. This study could not demonstrate an association between hope and stress scores and IVF outcomes. Moreover, this information may help reduce infertile women's stress and worry during infertility treatment.

ACKNOWLEDGMENTS

This study was financially supported by Guilan University of Medical Sciences in Rasht. We would like to thank the officials and employees of Shahid Beheshti School of Nursing and Midwifery, Al-Zahra Hospital Infertility Clinic, Mehr Infertility Institute of Guilan, and all the study participants. The authors declare no conflict of interest.

Authors' Contributions

"MSK": Study concept design, manuscript drafting/revision for intellectual content, data acquisition/analysis, literature review.

"SP": Guarantor of integrity of the entire study, study concept design, manuscript drafting/revision for intellectual content.

"MGS": Manuscript drafting/revision for intellectual content, manuscript editing.

"ZAR": Statistics.

The authors have read and approved the manuscript.

REFERENCES

- Zegers-Hochschild F, Adamson GD, Dyer S, et al. The international glossary on infertility and fertility care. *Fertil Steril* 2017;32(3):393–406. DOI: 10.1016/j.fertnstert.2017.06.005
- Kim SJ, Kim MR, Hwang SY, et al. Preliminary report on the safety of a new herbal formula and its effect on sperm quality. *World J Mens Health* 2013;31(3):254–261. DOI: 10.5534/wjmh.2013.31.3.254
- Kazemijaliliseh H, Ramezani Tehrani F, Behboudi-Gandevani S, et al. The prevalence and causes of primary infertility in Iran: a population-based study. *Glob J Health Sci* 2015;7(6):226–232. DOI: 10.5539/gjhs.v7n6p226
- Kupka MS, D'Hooghe T, Ferraretti AP, et al. Assisted reproductive technology in Europe, 2011: results generated from European registers by ESHRE. *Hum Reprod* 2016;31(2):233–248. DOI: 10.1093/humrep/dev319
- Stephen EH, Chandra A, King RB. Supply of and demand for assisted reproductive technologies in the United States: clinic- and population-based data, 1995–2010. *Fertil Steril* 2016;105(2):451–458. DOI: 10.1016/j.fertnstert.2015.10.007
- Novak E. *Berek and Novak Gynecology*. Tehran: Golban; 2020.
- Casu G, Gremigni P. Screening for infertility-related stress at the time of initial infertility consultation: psychometric properties of a brief measure. *J Adv Nurs* 2016;72(3):693–706. DOI: 10.1111/jan.12830
- Domar AD, Gross J, Rooney K, et al. Exploratory randomized trial on the effect of a brief psychological intervention on emotions, quality of life, discontinuation, and pregnancy rates in vitro fertilization patients. *Fertil Steril* 2015;104(2):440–451. DOI: 10.1016/j.fertnstert.2015.05.009
- Sethi P, Sharma A, Goyal LD, et al. Prevalence of psychiatric morbidity in females amongst infertile couples—a hospital based report. *J Clin Diagn Res* 2016;10(7):VC04–VC07. DOI: 10.7860/JCDR/2016/19639.8090
- Kaya Z, Oskay U. Stigma, hopelessness and coping experiences of Turkish women with infertility. *J Reprod Infant Psychol* 2020;38(5):485–496. DOI: 10.1080/02646838.2019.1650904
- Güneri SE, Kavlak O, Göker ENT. Hope and hopelessness in infertile women: phenomenological study. *Psikiyatr Guncel Yakasimlar* 2019;11:24–36. DOI:10.18863/pgy.530714
- Rooney KL, Domar AD. The relationship between stress and infertility. *Dialogues in Clin Neurosci* 2018;20(1):41–47. DOI: 10.31887/dcns.2018.20.1/klrooney

13. Hung J-H, Hu L-Y, Tsai S-J, et al. Risk of psychiatric disorders following polycystic ovary syndrome: a nationwide population-based cohort study. *PLoS One* 2014;9(5):e97041. DOI: 10.1371/journal.pone.0097041
14. Boivin J. How does stress, depression and anxiety affect patients undergoing treatment?. *Curr Opin Obstet Gynecol* 2019;31(3):195–199. DOI: 10.1097/GCO.0000000000000539
15. Haimovici F, Anderson JL, Bates GW, et al. Stress, anxiety, and depression of both partners in infertile couples are associated with cytokine levels and adverse IVF outcome. *Am J Reprod Immunol* 2018;79(4):e12832. DOI: 10.1111/aji.12832
16. Boivin J, Griffiths E, Venetis CA. Emotional distress in infertile women and failure of assisted reproductive technologies: meta-analysis of prospective psychosocial studies. *BMJ* 2011;342:d223. DOI: 10.1136/bmj.d223
17. Kermani Z, Khodapanahi M, Heidari M. Psychometrics features of the Snyder hope scale. *J Appl Psychol* 2011;5(19):7–23.
18. Snyder CR, Harris C, Anderson JR, et al. The will and the ways: development and validation of an individual-difference measure of hope. *J Pers Soc Psychol* 1991;60(4): 570–585. DOI: 10.1037//0022-3514.60.4.570
19. Newton CR, Sherrard W, Glavac I. The Fertility Problem Inventory: measuring perceived infertility-related stress. *Fertil Steril* 1999;72(1):54–62. DOI: 10.1016/s0015-0282(99)00164-8
20. Omani Samani R, Vesali S, Navid B, et al. Evaluation on hope and psychological symptoms in infertile couples undergoing assisted reproduction treatment. *Int J Fertil Steril* 2017;11(2):123–129. DOI: 10.22074/ijfs.2017.4838
21. Ghazavi Z, Kajbaf MB, Esmailzadeh M. Effect of hope therapy on the hope of diabetic patients. *Iranian J Nurs Midwifery Res* 2015;20(1): 75–80.
22. Ali WK, Ibrahim HI, Ibrahim HS. Resilience, distress and hope among infertile women undergoing in vitro fertilization (IVF) treatment: a correlation study. *World Journal of Nursing Sciences* 2018;4(3):98–110. DOI: 10.5829/idosi.wjns.2018.98.110
23. Mosalanejad L PN, Gholami M, Abdollahifard S. Increasing and decreasing factors of hope in infertile women with failure in infertility treatment: a phenomenology study. *Iranian J Reprod Med* 2014;12(2):117–124. Persian.
24. Shadbad NR, Vafa MA. Anticipating the amount of hope for infertile women undergoing IVF treatment based on psychological well-being and spiritual health. *Int J Sci Stud* 2017;5:286–292.
25. Amini L, Ghorbani B, Sadeghi AvvalShahr H, et al. The relationship between perceived social support and infertility stress in wives of infertile men Iran *J Nursing* 2018;31(111):31–39. DOI:10.29252/ijn.31.111.31
26. Li Y, Zhang X, Shi M, et al. Resilience acts as a moderator in the relationship between infertility-related stress and fertility quality of life among women with infertility: a cross-sectional study. *Health Qual Life Outcomes* 2019;17(1):38. DOI: 10.1186/s12955-019-1099-8
27. Gozuyesil E, Karacay Yikar S, Nazik E. An analysis of the anxiety and hopelessness levels of women during IVF-ET treatment. *Perspect Psychiatr Care* 2020;56(2):338–346. DOI: 10.1111/ppc.12436
28. Terzioglu F, Turk R, Yucel C, et al. The effect of anxiety and depression scores of couples who underwent assisted reproductive techniques on the pregnancy outcomes. *African Health Sci* 2016;16(2):441–450. DOI: 10.4314/ahs.v16i2.12
29. Miller N, Herzberger EH, Pasternak Y, et al. Does stress affect IVF outcomes? A prospective study assessing cortisol levels and stress questionnaires for women undergoing through IVF treatments. *Reprod Biomed Online* 2019;39(1):93–101. DOI: 10.1016/j.rbmo.2019.01.012
30. Samani RO, Almasi-Hashiani A, Shokri F, et al. Validation study of the fertility problem inventory in Iranian infertile patients. *Middle East Fertil Soci J* 2017;22(1):48–53. DOI: 10.1016/j.mefs.2016.07.002
31. Pasch LA, Gregorich SE, Katz PK, et al. Psychological distress and in vitro fertilization outcome. *Fertil Steril* 2012;98(2): 459–464. DOI: 10.1016/j.fertnstert.2012.05.023
32. Pedro J, Sobral MP, Mesquita-Guimarães J, et al. Couples' discontinuation of fertility treatments: a longitudinal study on demographic, biomedical, and psychosocial risk factors. *J Assist Reprod Genet* 2017;34(2):217–224. DOI: 10.1007/s10815-016-0844-8
33. Maroufizadeh S, Karimi E, Vesali S, et al. Anxiety and depression after failure of assisted reproductive treatment among patients experiencing infertility. *Int J Gynecol Obstet* 2015;130(3): 253–256. DOI: 10.1016/j.ijgo.2015.03.044