Cognitive emotion regulation, anxiety, and depression in infertile women: a cross-sectional study

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Abstract

Background: Cognitive strategies play an important role in the prevention of psychological disorders. The aim of this study was to examine the relationships of cognitive emotion regulation with anxiety and depression symptoms in a sample of infertile women in Iran.

Results: According to correlation analysis, all adaptive strategies (i.e., acceptance, positive refocusing, refocus on planning, positive reappraisal, and putting into perspective), except for Acceptance strategy, were indirectly related to both anxiety and depression symptoms. Conversely, four maladaptive strategies (i.e., self-blame, rumination, catastrophizing, and other-blame) were positively related to anxiety and depression symptoms. After controlling for demographic/infertility information, hierarchical regression analyses indicated that acceptance, rumination, and positive refocusing subscales were significantly associated with anxiety; and refocus of planning was related to depression.

Conclusion: In sum, cognitive emotion regulation strategies appeared to be related to anxiety and depression symptoms in women suffering from infertility. These results suggest the use of cognitive therapy to reduce the anxiety and depression in these women.

Keywords: Cognitive emotion regulation, Depression, Anxiety, Infertility

Background

Infertility is defined as "the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse" [1] and affects 9% of reproductive-aged couples worldwide [2]. It is a negative life event and therefore may be leading to negative psychological consequences. Anxiety and depression are two of the most commonly occurring psychological disorders in infertile patients [3, 4]. Infertility and its treatments also may adversely affect marital satisfaction, life satisfaction, and quality of life [5–7]. In addition, it is widely acknowledged that women are more affected than

men by infertility, particularly in developing countries. For example, in a study conducted among infertile couples in Iran, women were more likely to have depression symptoms and impaired quality of life than men [8]. A growing body of research indicated that psychological distress in response to the experience of adverse life events may be correlated with the cognitive emotion regulation strategies (or cognitive coping) that someone uses to deal with that negative life event [9].

Cognitive emotion regulation strategies can be defined as "the conscious mental strategies individuals use to handle the intake of emotionally arousing information" [9, 10]. Several individual emotion-regulation strategies have been hypothesized to be risk factors for or protective factors against psychopathology. To measure cognitive coping, Garnefski et al. [10] developed the Cognitive

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Emotion Regulation Questionnaire (CERQ). The CERQ measures nine different cognitive emotion regulation strategies including five adaptive strategies (acceptance, positive refocusing, refocus on planning, positive reappraisal, and putting into perspective) and four maladaptive strategies (self-blame, rumination, catastrophizing, and other-blame). The definitions of these strategies were as follows: (1) self-blame, referring to "thoughts of putting the blame of what you have experienced on yourself"; (2) other-blame, referring to "thoughts of putting the blame of what you have experienced on the environment or another person"; (3) rumination, referring to "thinking about the feelings and thoughts associated with the negative event"; (4) catastrophizing, referring to "thoughts of explicitly emphasizing the terror of what you have experienced"; (5) putting into perspective, referring to "downgrading the importance of the event"; (6) positive refocusing, referring to "thinking about positive experiences instead of thinking about the actual event";(7) positive reappraisal, referring to "thoughts of giving the event a positive meaning in terms of personal growth"; (8) acceptance, referring to "thoughts of resigning yourself to what has happened"; and (9) refocus on planning, referring to "thinking about what steps to take and how to handle the negative event" [9, 10]. Previous studies suggest that maladaptive strategies are commonly correlated with depression and anxiety symptoms and have formed the basis of studies on the cognitive model of depression [11]. Previous researches have shown that maladaptive strategies such as ruminating, self-blame, and catastrophizing are positively correlated to depression, anxiety, and/or other relevant measures, while adaptive strategies such as positive refocusing and positive reappraisal are negatively related [12–15].

As cognitive strategies play an important role in the development, maintenance, and exacerbation of depression and anxiety symptoms, it seems important to determine cognitive emotion regulation strategies correlated with vulnerability to depression and anxiety [15]. Therefore, the current study was conducted to identify cognitive emotion regulation strategies associated with anxiety and depression among infertile women.

Methods

Participants and study design
This was a cross-sectional study performed in the Royan Institute, a referral fertility center in Tehran, Iran, from February to March 2017. Participants were a sample of 240 women with infertility. The eligibility criteria were as follows: (1) women aged 18–45 years, (2) experiencing fertility problems, and (3) ability to read and write in Persian. The study was approved by the Ethics Committee of the Royan Institute and verbal informed consent

to participate in the study was obtained from the participants.

Instruments
Demographic and clinical information
Before completing the main questionnaires related to this study, demographic, and fertility information including age, marital duration, employment statue, educational level, infertility duration, cause of infertility, previous treatment failures, and history of abortion were gathered.

Cognitive emotion regulation questionnaire (CERQ)
The CERQ is a 36-item self-report questionnaire that measures the cognitive aspects of emotion regulation [10]. It consists of nine subscales: self-blame, acceptance, rumination, positive refocusing, refocus on planning, positive reappraisal, putting into perspective, catastrophizing, and other-blame. All CERQ subscales consist of 4 items, with each item rated on a 5-point Likert scale, ranging from 1 (almost never) to 5 (almost always).

Hospital anxiety and depression scale (HADS)
The HADS is a 14-item self-report instrument. It consists of two subscales (each of 7 items), measuring the level of anxiety and depression symptoms. Each item is measured on a 4-point Likert scale ranging from 0 to 3. The HADS subscale scores can range from 0 to 21, with higher scores indicating more anxiety or depression symptoms. The Persian version of HADS is reported to have adequate psychometric properties in infertile people [16]. In the current study, internal consistency reliability was good for anxiety (α = 0.850) and depression (α = 0.782) subscales.

Statistical analysis
Statistical analysis conducted using IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp., Armonk, NY, USA). Pearson's correlation coefficient was calculated to evaluate the relationships among the major variables. Hierarchical multiple linear regression was used to determine the relationships of CERQ subscales with anxiety and depression, controlling for demographic/clinical variables. Two steps were performed: (1) in the first step, the demographic/clinical variables were entered in the first block to control for their effects on anxiety and depression; (2) in the second step, the nine CERQ subscales were entered in the second block. In addition, anxiety and depression models were checked for multicollinearity by using tolerance and variance inflation factor (VIF). A tolerance < 0.1 and/or VIF > 5 indicates a multicollinearity problem. None of the variables showed significant multicollinearity.

Results

Participant characteristics

In total, 240 women participated in this study. The mean age of the women was 32.78 (SD = 5.44) years, and mean infertility duration was 6.81 (SD = 4.30) years. The majority were housewives (92.6%) and approximately half of the women had male factor infertility (47.5%). Of the participants, 39.6% had a university education, 66.2% reported at least one failure in previous infertility treatment, and 22.1% reported a history of abortion (Table 1).

Descriptive statistics and correlations among study variables

Means, SDs, and correlations for HADS subscales and CERQ subscales are presented in Table 2. The mean score of anxiety and depression was 7.35 (SD = 4.26) and 5.58 (SD = 3.77), respectively. Using the HADS value of 8 as a cut-off point, the prevalence rates of anxiety and depression were 41.7% and 29.6%, respectively. As seen in Table 2, all adaptive strategies, expect for acceptance strategy, were indirectly related to both anxiety and depression scores. Conversely, four maladaptive strategies were positively related to anxiety and depression scores. In general, the highest and lowest mean

Table 1 Demographic and clinical characteristics of the participants (*n* = 240)

	mean ± SD or *n* (%)
Age (years)	32.78 ± 5.44
Duration of marriage (years)	8.50 ± 4.49
Duration of infertility (years)	6.81 ± 4.30
Educational level	
Primary	57 (23.8)
Secondary	88 (36.7)
University	95 (39.6)
Occupation	
Housewife	196 (81.7)
Employed	44 (18.3)
Cause of infertility	
Male factor	114 (47.5)
Female factor	53 (22.1)
Both	44 (18.3)
Unexplained	29 (12.1)
Failure of previous treatment	
No	81 (33.8)
Yes	159 (66.2)
History of abortion	
No	187 (77.9)
Yes	53 (22.1)

SD standard deviation

scores of CERQ subscales were observed in "adaptive strategies" and "maladaptive strategies," respectively.

Multiple linear regression analysis

Hierarchical multiple linear regression analysis was used to identify variables that were significantly independently associated with anxiety and depression scores (Table 3). Based on the standardized regression coefficients in block 1, only the history of abortion was significantly related to anxiety (β = 0.144, *P* = 0.039). The model R^2 when demographics/infertility variables were in the anxiety model was equal to 0.055, suggesting that 5.5% of the variance in anxiety was explained by these variables. In block 2, among the CERQ subscales, acceptance and positive refocusing subscales were negatively correlated with anxiety (β = − 0.146, *P* = 0.026; β = − 0.234, *P* = 0.014, respectively) and rumination subscale was positively correlated with anxiety (β = 0.271, *P* = 0.001). When the CERQ subscales were added in the model, there was a significant improvement in the model (ΔR^2 = 0.260, *F* change = 9.284, *P* < 0.001). More specifically, an additional 26.0% of the variance in anxiety was explained by the CERQ subscales.

For depression, in block 1, marital duration and educational level were significantly related to depression (β = − 0.246, *P* = 0.028; β = − 0.148, *P* = 0.042, respectively). Furthermore, the groups of women with female and unknown causes of infertility reported higher depression than women with male factor infertility. The model R^2 in this step was 0.094, suggesting that 9.4% of the variance in depression was explained by demographics and infertility information. In block 2, among the CERQ subscales, only the refocus on planning subscale was negatively correlated with depression (β = − 0.203, *P* = 0.027). When the CERQ subscales were added in the model, there was a significant improvement in the model (ΔR^2 = 0.229, *F* change = 8.256, *P* < 0.001). More specifically, an additional 22.9% of the variance in depression was explained by the CERQ subscales. The total proportion of variance explained in anxiety and depression explained by all the independent variables was 31.5% and 32.3%, respectively (Table 3).

Discussion

The main objective of the present study was to examine the relationship of cognitive emotion regulation with anxiety and depression symptoms in women with infertility. In the present study, the prevalence of anxiety and depression symptoms were 41.7% and 29.6%, respectively, which are consistent with previous studies in Iran [3, 4]. We investigated the relationships of demographic and infertility variables with anxiety and depression. Among demographic and infertility variables, only the history of spontaneous abortion was significantly related

Table 2 Means, standard deviations, and correlations among study variables (*n* = 240)

	Mean (SD)	1	2	3	4	5	6	7	8	9	10	11
1. Anxiety	7.35 (4.26)	1										
2. Depression	5.58 (3.77)	0.50***	1									
3. Self-blame	7.55 (3.73)	0.34***	0.38***	1								
4. Acceptance	12.15 (3.72)	− 0.03	− 0.03	0.19**	1							
5. Rumination	12.28 (3.58)	0.37***	0.27***	0.46***	0.29***	1						
6. Positive refocusing	13.07 (3.99)	− 0.35***	− 0.41***	− 0.30***	0.09	− 0.09	1					
7. Refocus on planning	14.09 (3.77)	− 0.27***	− 0.39***	− 0.19**	0.17**	0.05	0.72***	1				
8. Positive reappraisal	13.43 (4.07)	− 0.27***	− 0.38***	− 0.33***	0.17**	− 0.06	0.69***	0.69***	1			
9. Putting into perspective	12.68 (3.71)	− 0.21***	− 0.34***	− 0.25***	0.27***	− 0.06	0.54***	0.47***	0.56***	1		
10. Catastrophizing	9.57 (3.88)	0.38***	0.37***	0.55***	0.23***	0.59***	− 0.25***	-0.15**	-0.28***	-0.24***	1	
11. Other-blame	6.49 (3.16)	0.30***	0.29***	0.46***	0.05	0.41***	− 0.16*	-0.05	-0.14*	-0.18**	0.48***	1

Note. *SD* standard deviation
*p < 0.05; **p < 0.01; ***p < 0.001

Table 3 Results of hierarchical multiple linear regressions, including factors related to anxiety and depression

	Anxiety				Depression			
	B	SE	Beta	P	B	SE	Beta	P
Block 1: Demographic/fertility variables								
Age (years)	0.007	0.034	0.014	0.839	0.028	0.029	0.064	0.331
Marital duration (years)	− 0.154	0.108	− 0.162	0.155	-0.206	0.093	-0.246	0.028
Job (employed vs housewife)	− 0.760	0.804	− 0.069	0.346	-0.276	0.697	-0.028	0.693
Educational level (academic vs non-academic)	− 0.329	0.643	− 0.038	0.609	-1.137	0.557	-0.148	0.042
Infertility duration (years)	0.133	0.114	0.134	0.246	0.188	0.099	0.214	0.059
Cause of infertility								
Male factor (Ref)								
Female factor	1.110	0.731	0.108	0.131	1.500	0.634	0.165	0.019
Both	− 0.094	0.763	− 0.009	0.902	0.769	0.661	0.079	0.246
Unknown	1.454	0.916	0.111	0.114	1.808	0.794	0.157	0.024
Previous treatment failures (yes vs. no)	0.058	0.619	0.006	0.925	0.567	0.536	0.071	0.291
History of abortion (yes vs. no)	1.477	0.689	0.144	0.033	0.361	0.597	0.040	0.546
Model characteristics	$R^2 = 0.055$				$R^2 = 0.094$			
Block 2: CERQ subscales								
Self-blame	0.094	0.089	0.082	0.293	0.139	0.078	0.138	0.077
Acceptance	− 0.167	0.074	− 0.146	0.026	-0.042	0.065	-0.042	0.518
Rumination	0.322	0.094	0.271	0.001	0.113	0.083	0.107	0.177
Positive refocusing	− 0.250	0.101	− 0.234	0.014	-0.145	0.089	-0.153	0.106
Refocus on planning	− 0.147	0.103	− 0.130	0.156	-0.203	0.091	-0.203	0.027
Positive reappraisal	0.064	0.097	0.061	0.509	0.009	0.085	0.009	0.919
Putting into perspective	0.036	0.087	0.031	0.679	-0.051	0.076	-0.051	0.502
Catastrophizing	0.160	0.091	0.146	0.080	0.081	0.080	0.083	0.314
Other-blame	0.084	0.093	0.062	0.365	0.108	0.082	0.090	0.188
Model characteristics	$R^2 = 0.315$, $\Delta R^2 = 0.260$, *F* change = 9.284, *p* < 0.001				$R^2 = 0.323$, $\Delta R^2 = 0.229$, F Change = 8.256, p < 0.001			

Note. *B* unstandardized coefficient, *SE* standard error, *Beta* standardized coefficient

to anxiety scores, as women with a history of spontaneous abortion had high anxiety symptoms. Our findings showed that depression was more common in women with short marital duration as well as women with low educational level and women with female factor and unknown cause of infertility [3, 17].

Generally, our findings show that the adaptive strategies were reported to have been used more often than the maladaptive strategies. Among the adaptive strategies, acceptance was the least frequently implemented, and among the maladaptive strategies, other-blame was the least frequently implemented. These findings are consistent with previous studies [10, 18–21].

According to the bivariate correlation analysis, all CERQ subscales, except for acceptance, correlated significantly with both anxiety and depression. Positive refocusing, refocus on planning, positive reappraisal, and putting into perspective correlated negatively with both anxiety and depression symptoms. Self-blame, rumination, catastrophizing, and other-blame correlated positively with anxiety and/or depression symptoms. When looking at the strengths of the correlations, the maladaptive strategies were more strongly related to depression than anxiety.

Among cognitive emotion regulation strategies, only refocus on planning strategy was independently negatively correlated with depression in multivariate analyses after controlling for demographic and infertility variables. In multivariate analysis, more engagement of rumination as well as less engagement of acceptance and positive refocusing independently contributed to anxiety. This finding corresponds to findings reported in previous studies performed in various populations [12–15, 18, 19, 21, 22].

One implication of the current study is that it may not be appropriate to consider the Acceptance subscale as an adaptive strategy, as recommended by Garnefski et al. [10]. Although we found partial support for the adaptive role of acceptance in that it was positively related to some other adaptive strategies (i.e., refocus on planning, positive reappraisal, and putting into perspective), acceptance was also positively correlated with some maladaptive strategies (i.e., self-blame, rumination, and catastrophizing strategies). In addition, among 9 subscales of CERQ, only acceptance subscale was not correlated with anxiety and depression symptoms according to the univariate analysis. One possible explanation is that the acceptance items (e.g., "I think that I have to accept that this has happened," "I think that I have to accept the situation," etc.) may reflect a degree of hopelessness. Therefore, acceptance strategy may be adaptive only in certain conditions. Due to the abovementioned findings, we suggest interpreting this subscale with caution. Whether acceptance strategy is adaptive or maladaptive depends on the circumstance and the type of mood under study. This finding is in line with a study performed by Martin and Dahlen [23].

For future research, we recommend comparing cognitive emotion regulation strategies by gender, cause of infertility. In addition, it would be useful to set up randomized controlled trials in which anxiety and depression symptoms in patients with infertility are compared before and after cognitive behavioral therapy.

The present study has several limitations that need to be noted. First, it was a single-center study utilizing only infertile women. Second, the sample size was relatively small. So, the generalizability of the findings may be limited by the characteristics of our study sample. Third, all variables were measured via self-report instruments. This may have caused bias. Forth, because of the cross-sectional nature of the study, it is not possible to infer causality between study variables.

Conclusion

Our findings provide further empirical support for the relationship between cognitive emotion regulation strategies and symptoms of anxiety and depression in infertile women and evidence for designing emotion regulation therapies such as cognitive behavioral therapy (CBT) to reduce the anxiety and depression symptoms in these women.

Authors' contributions
FF and SM: Study design and conception; Data analysis and interpretation; Manuscript writing; ROS, and BN: Study design and conception, data acquisition, and manuscript writing. PA, AAH, and MS: Study design and conception; Data interpretation; Manuscript writing; All authors approved the final version of the manuscript for submission.

Availability of data and materials
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate
The Ethics Committee of Royan Institute, Tehran, Iran, approved this study (registration number: IR.ACECR.ROYAN.REC.1395.141). All the women were informed about the aim of the study verbally, and all the ethical points were written at the above of the questionnaires including confidentiality of the data, involuntariness of the cases, and no relation of this study to their treatment process. Thus, freely filling the questionnaires was considered as consent.

Consent for publication
Not applicable.

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