

## Original Research Article

# ASSESSMENT OF HARDINESS AND COPING STYLES AMONG COUPLES UNDERGOING INFERTILITY TREATMENT AT A TERTIARY CARE CENTRE IN NORTH INDIA

Raies Ahmed<sup>1</sup>, Priyanka Singh<sup>2</sup>, Shubham Sharma<sup>3</sup>, Sabahuddin Ammar<sup>4</sup>

<sup>1</sup>Assistant Professor, Department of Psychiatry, Rajshree Medical Research Institute, Bareilly, Uttar Pradesh, India.

<sup>2</sup>Professor, Department of Psychiatry, B S Kushwaha institute of Medical Sciences, Lakhanpur, Kanpur, Uttar Pradesh, India.

<sup>3</sup>Assistant Professor, Department of Psychiatry, Rajshree Medical College, Rithora, Bareilly, Uttar Pradesh, India.

<sup>4</sup>Consultant Psychiatrist, Autonomous State Medical College, Sultanpur, Uttar Pradesh, India.

Received : 05/04/2026  
Received in revised form : 20/05/2026  
Accepted : 06/06/2026

### Corresponding Author:

**Dr. Raies Ahmed,**  
Assistant Professor, Department of  
Psychiatry, Rajshree Medical Research  
Institute, Bareilly, Uttar Pradesh, India.  
Email: raiesahmed786@gmail.com

DOI: 10.70034/ijmedph.2026.2.551

Source of Support: Nil,  
Conflict of Interest: None declared

**Int J Med Pub Health**  
2026; 16 (2); 3329-3334

### ABSTRACT

**Background:** Having a progeny is an aspiration that is shared universally across the world, though the sensitivities may vary in degree depending on the cultural and personal context. **Objective:** to assess the hardiness and coping styles in the infertile couples undergoing Infertility Treatment at a Tertiary Care Centre In North India.

**Materials and Methods:** After obtaining informed written consent, cases were screened for various psychiatric comorbidities such as depression, and anxiety disorder with the help of a detailed medical history and mental status examination. Patients satisfying the inclusion and exclusion criteria would then be assessed further with the help of the Hardiness scale and with the help of a coping inventory.

**Results:** This cross-sectional study specifically assessed how they coped with distress. Our study's endeavour was to find correlation if any with certain variables closely associated with stress of infertility. These results demonstrate the necessity of focused therapies and thorough healthcare planning to treat the mental health issues encountered during this crucial time.

**Conclusion:** Inverse correlation of hardiness and severity of anxiety or depression gives us a unique opportunity to identify patients, who are less hardy and thus more likely to decompensate.

**Keywords:** Hardiness scale, coping inventory, infertile couples undergoing Infertility Treatment.

## INTRODUCTION

Coping refers to behaviour and attitude toward a perceived problem that they utilize to minimize the psychological distress. The protective function of coping behaviour can be exercised by eliminating or modifying conditions giving rise to problems and managing the emotional consequences of problems<sup>1</sup>. Resilience reflects a dynamic union of variables that ensures positive adaptation of an individual despite being exposed to adversities.<sup>[2]</sup> Three fundamental building blocks of resilience are identified in the form of- a secure base, good self-esteem and a sense of self efficacy. Three basic models of resilience have been proposed to describe the mechanism which alters the

trajectory from the risk exposure to a negative consequences: compensatory model, protective model, and inoculation model.<sup>[3]</sup>

Mental health care during infertility treatment in couples who are widely presumed to be psychological distressed is often neglected. Stress, anxiety and depression in infertile couples have been shown to be correlated with various factors in national and international studies. Addressing the psychological issues during the treatment course can ascertain the adherence to treatment and eventual successful outcome of treatment. Another Indian study done to assess prevalence of depression, anxiety and stress in infertile women and the impact of counselling found that counselling significantly

lowers these and along with regular treatment for infertility also improved the treatment outcome.<sup>[4]</sup> Hence the present study was done at our tertiary care centre to assess the hardiness and coping styles in the infertile couples.

## MATERIALS AND METHODS

This cross-sectional observational cohort study was carried out in a tertiary care hospital, which is also a teaching institute, after taking Hospital Ethics committee approval. Consecutive 160 Infertile couples (cases) freshly registered for treatment or undergoing treatment by Assisted Reproductive Technique (ART) and meeting inclusion and exclusion criteria were recruited in the study with their written and informed consent. The data collection was carried out during a period of 18 months from Feb 2024 to July 2025.

### Inclusion Criteria

Married infertile couples freshly registered as well as couples already undergoing treatment at ART (Assisted Reproductive Techniques) center at Rajshree Medical Research Institute.

Aged between 18 - 49 yrs.

Couples consenting to participate in the study.

### Exclusion Criteria

Couples where consent is not forthcoming to participate in the study.

Those under treatment, for any other illness except infertility at the time of study, so as to mitigate the possible confounding effects of this variable on symptoms of anxiety and depression in sample population.\*

Past history of any psychiatric disorder.

\*For e.g if an individual is also under treatment for a diagnosed and chronic disease like Tuberculosis, Cancer etc, it will possibly be a confounding variable having effect on the study population.

Scale Used

Brief COPE inventory

Hardiness scale

### Brief Cope Inventory

The Brief COPE scale is an abbreviated version of the COPE Inventory created partly because earlier patient samples became impatient at responding to the full instrument (both because of the length and redundancy of the full instrument and because of the overall time burden of the assessment protocol). It was designed to assess a broad range of coping responses among adults for all diseases.<sup>[5,6]</sup>

It contains 28 items and is rated by the four-point Likert scale, ranging from “I haven’t been doing this at all” (score one) to “I have been doing this a lot” (score four). In this study, the higher score represents greater coping strategies used by the respondents. In total, 14 dimensions are covered by this scale. These are self- distraction, active coping, denial, substance use, use of emotional support, use of instrumental support, behavioural disengagement, venting, positive reframing, planning, humour, acceptance,

religion and self-blame. Every dimension has two items.

Active coping is the process of taking active steps to attempt to get rid of the stressor or to reorganize its effects.<sup>6</sup> Planning is thinking about how to handle a stressor. It engages with the action strategies, thinking about what steps to get hold of and how best to cope with the problem. Seeking instrumental support is looking for advice, help or information.<sup>[6]</sup> Meanwhile seeking emotional support is attainment of moral support, compassion or sympathetic. Behavioural disengagement is an action related to one’s attempt to disengage with the stressor, even giving up the endeavour to accomplish goals with which the stressor is intrusive. Another dimension i.e. denial, is a response that occasionally appears in principal appraisal, practical, diminishing distress and in that way easing coping. Acceptance is a functional coping reaction, in that an individual who accepts the reality of a stressful situation would employ an effort to arrange with the situation. Religion, another important dimension is included in the scale as it serves as a source of emotional support. It is observed that one might turn to religion when living under stressful events.

A report to establish the reliability and validity of the scale indicated a high Cronbach’s alpha values for some domains such as Religion ( $\alpha=0.82$ ) and Substance use ( $\alpha=0.90$ )<sup>170</sup>. Other domains indicated acceptable values of Cronbach’s alpha. They are Active coping ( $\alpha=0.68$ ), Planning ( $\alpha=0.73$ ), Positive Reframing ( $\alpha=0.64$ ), Acceptance ( $\alpha=0.57$ ), Humor ( $\alpha=0.73$ ), Using Emotional Support ( $\alpha=0.71$ ), Using Instrumental Support ( $\alpha=0.64$ ), Self-distraction ( $\alpha=0.71$ ), Denial ( $\alpha=0.54$ ), Venting ( $\alpha=0.50$ ), Behavioral disengagement ( $\alpha=0.65$ ) and Self-blame ( $\alpha=0.69$ ).

### Hardiness Scales

The genealogy of the present short hardiness scale leads back to the original 53- item version used by Maddi, Kobasa and students at the University of Chicago in the early 1980's, primarily with samples of Illinois Bell executives.<sup>[7]</sup> By adding new items and eliminating poor ones, a new 50-item scale was developed for use with city bus drivers (Bartone, 1989)<sup>8</sup>. Additional psychometric refinement with military samples led to an improved 45-item version, and then a 30-item scale (Bartone et al, 1989; Bartone, 1991).<sup>[9]</sup> Careful item and reliability analyses with mixed-gender samples has resulted in a 12-item measure that displays good psychometric properties, and good evidence for the validity of the instrument as a measure of the hardiness construct. Cronbach’s alpha coefficient for the total hardiness measure is .83, and for the facets, .77 (commitment), .71 (control), and .70 (control).

It contains 12 items and is rated by the four-point likert scale, ranging from “Strongly disagree” (score zero) to “Strongly agree” (score three). These questions measure control, commitment and challenge. For half the questions, a high score (like 3,

"strongly agree") indicates hardiness; for the other half, a low score (disagreement) does.

### Methodology

160 infertile couples were included. All subjects were informed about purpose of interview and details of the study. Confidentiality was assured. All the subjects co-operated adequately with interest and informed consent. Baseline demographic data of subjects were entered in semi structured Performa on registration to OPD.

Than their resilience and coping mechanism were assessed by Hardiness - 12 scale and Brief Cope Questionnaire respectively.

### Statistical Analysis

Descriptive and inferential statistical analyses were carried out in the present study. Results on continuous measurements were presented on Mean  $\pm$  SD and results on categorical measurement were presented in number (%). Level of significance was fixed at  $p=0.05$  and any value less than or equal to 0.05 was considered to be statistically significant.

The Statistical software IBM SPSS statistics 29.0 (IBM Corporation, Armonk, NY, USA) was used for the analyses of the data and Microsoft word and Excel were used to generate graphs and tables.

## RESULTS

Majority of females belonged to age group of 25-34 years (83.8%) and majority of males belonged to age group of 25-39 year (92.5%). Majority of female and

male were educated up to higher secondary or graduate level (84.5 and 82.5 respectively). Majority of participants had rural origins (75.6%). Majority of the couples had been married for 1-9 years (75.8 %). About 85% couples had not conceived before and 97.5% of participants had no living children. 51.2 % of participants had not received any prior treatment. The male cause of infertility was much lesser than 50 %

The mean hardiness of female pts was 3.51 with SD of 5.142 and that of male pts was 6.28 with SD of 5.333. The difference in mean hardiness of female pts and male pts was statistically significant ( $p < 0.001^{**}$ ).

The majority of both Female and Male participants had moderately hardy personality. The difference in level of resilience of male and female participants when evaluated categorically, was statistically significant ( $p = < 0.001^{**}$ ).

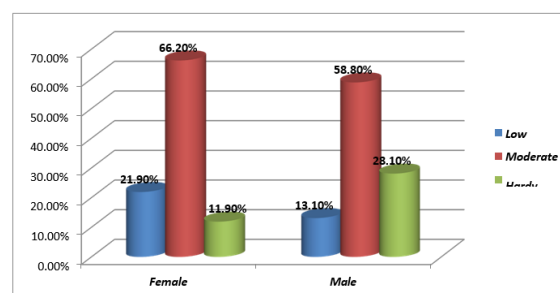


Figure 1: Comparison of the Hardiness score among males and females using Chi square test

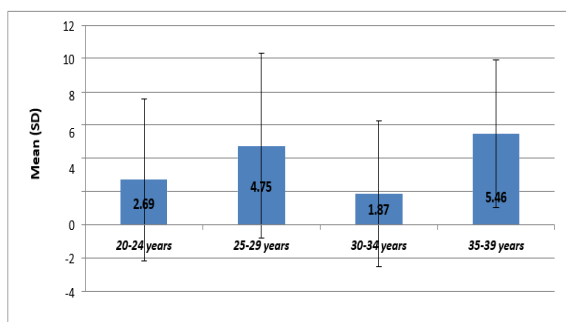
Table 1: Comparison of the Coping mechanisms in terms of {Mean (SD)} among males and females using unpaired t test

Variables	Gender	N	Mean	Std. Deviation	t value	P value
Self-distraction	Female	160	6.02	1.684	1.587	0.114
	Male	160	5.71	1.768		
Active coping	Female	160	6.55	1.297	0.760	0.448
	Male	160	6.44	1.349		
Denial	Female	160	4.13	1.835	1.568	0.118
	Male	160	3.79	1.943		
Substance use	Female	160	2.40	0.985	1.644	0.101
	Male	160	2.62	1.364		
Emotional support	Female	160	5.71	1.520	0.244	0.807
	Male	160	5.67	1.212		
Behavioral disengagement	Female	160	5.40	1.683	1.074	0.283
	Male	160	5.19	1.750		
Venting	Female	160	4.71	1.266	0.0	1.000
	Male	160	4.71	1.394		
Instrumental support	Female	160	5.41	1.820	2.301	0.022*
	Male	160	4.95	1.726		
Positive reframing	Female	160	6.46	1.508	0.585	0.559
	Male	160	6.36	1.353		
Self-blame	Female	160	3.59	1.519	0.181	0.856
	Male	160	3.56	1.561		
Planning	Female	160	5.76	1.438	0.613	0.540
	Male	160	5.66	1.652		
Humor	Female	160	3.53	1.423	0.667	0.506
	Male	160	3.42	1.592		
Acceptance	Female	160	5.93	1.304	2.167	0.031*
	Male	160	5.58	1.620		
Religion	Female	160	6.18	1.594	1.620	0.106
	Male	160	5.88	1.783		

Among the 14 Coping Styles both female and male had similar pattern. Predominant mechanism utilised

being Active coping, Positive reframing, Self-Distraction, Religion, Acceptance and Planning

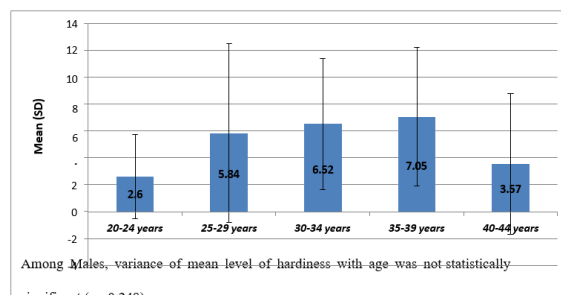
while Substance use, Humour, Self-blame and Denial were the least utilised by both female and male participants. However statistically significant difference was evident in use of Instrumental support and Acceptance by females.



**Figure 2: Comparison of the Hardiness score in terms of {Mean (SD)} among different age groups in Females using ANOVA test**

Among Females, mean level of hardiness showed a bimodal peak at 25-29 years and 35-39 years, which

was statistically significant ( $p=0.019^*$ ). Post hoc analysis by Tukey honestly significant difference (HSD) revealed that among the means of hardiness with different age groups statistically significant difference exist only between age group of 25-29 yrs with 30-34 yrs.



**Figure 3: Comparison of the Hardiness score in terms of {Mean (SD)} among different age groups in males using ANOVA test**

**Table 2: Relationship of the Coping mechanisms in terms of {Mean (SD)} among Anxious males and females using unpaired t test**

Variables	Gender	N	Mean	Std. Deviation	t value	P value
Self-distraction	Female	83	5.85	1.693	1.331	0.185
	Male	65	5.46	1.871		
Active coping	Female	83	6.65	1.211	0.001	0.999
	Male	65	6.65	1.292		
Denial	Female	83	3.96	1.990	1.238	0.218
	Male	65	3.57	1.820		
Substance use	Female	83	2.30	0.912	1.796	0.075
	Male	65	2.68	1.572		
Emotional support	Female	83	5.73	1.663	0.346	0.730
	Male	65	5.65	1.230		
Behavioural disengagement	Female	83	5.98	1.361	1.777	0.078
	Male	65	5.54	1.621		
Venting	Female	83	5.00	1.176	1.689	0.093
	Male	65	4.65	1.363		
Instrumental support	Female	83	5.32	1.974	0.500	0.618
	Male	65	5.15	1.954		
Positive reframing	Female	83	6.32	1.295	2.484	0.014*
	Male	65	6.82	1.088		
Self-blame	Female	83	3.45	1.492	0.627	0.532
	Male	65	3.29	1.568		
Planning	Female	83	5.93	1.530	0.170	0.865
	Male	65	5.97	1.468		
Humour	Female	83	3.87	1.530	0.860	0.391
	Male	65	3.63	1.782		
Acceptance	Female	83	6.23	1.210	0.258	0.797
	Male	65	6.17	1.719		
Religion	Female	83	6.93	1.284	4.262	<0.001**
	Male	65	5.89	1.659		

( $p < 0.05$  - Significant\*,  $p < 0.001$  - Highly significant\*\*)

Anxious females used religion more often than the anxious males as a coping style while anxious male used positive reframing more often than the anxious females and the gender difference in coping style was

statistically significant in only these two coping domains, ( $p < 0.001^{**}$ ) and ( $p < 0.014^*$ ) respectively.

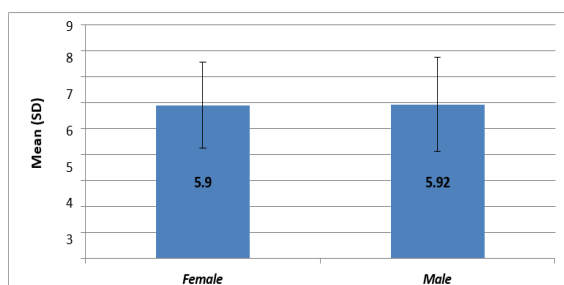
**Table 3: Relationship of the Coping mechanisms in terms of {Mean (SD)} among Depressed males and females using unpaired t test**

Variables	Gender	N	Mean	Std. Deviation	t value	P value
Self-distraction	Female	69	5.90	1.655	0.069	0.945
	Male	62	5.92	1.813		
Active coping	Female	69	6.49	1.093	1.492	0.138

	Male	62	6.18	1.325		
Denial	Female	69	3.93	1.478	1.923	0.057
	Male	62	3.45	1.339		
Substance use	Female	69	2.55	1.119	2.615	0.010*
	Male	62	3.24	1.853		
Emotional support	Female	69	5.77	1.238	1.840	0.068
	Male	62	5.35	1.332		
Behavioural disengagement	Female	69	4.80	1.568	1.339	0.183
	Male	62	5.15	1.389		
Venting	Female	69	4.41	.960	4.220	<0.001**
	Male	62	5.16	1.089		
Instrumental support	Female	69	5.59	.792	0.483	0.630
	Male	62	5.50	1.388		
Positive reframing	Female	69	7.04	1.091	2.681	0.008*
	Male	62	6.47	1.364		
Self-blame	Female	69	3.68	1.430	1.122	0.264
	Male	62	3.97	1.493		
Planning	Female	69	5.80	.964	0.041	0.967
	Male	62	5.81	1.577		
Humour	Female	69	3.28	1.413	3.413	<0.001**
	Male	62	4.23	1.769		
Acceptance	Female	69	5.65	1.304	1.025	0.307
	Male	62	5.92	1.672		
Religion	Female	69	5.67	1.569	0.497	0.620
	Male	62	5.81	1.648		

( $p < 0.05$  - Significant\*,  $p < 0.001$  - Highly significant\*\*)

Statistical significant difference in coping styles in depressed males and females was evident in 04 coping domains; in that males deployed more of substance use, venting and humour ( $p < 0.010^*$ ) ( $p < 0.001^{**}$ ) and ( $p < 0.001^{**}$ ), respectively, as compared to females while the latter used positive reframing as a prominent coping mechanism as compared to males ( $p < 0.008^*$ ).



**Figure 4: Comparison of the Coping mechanisms in terms of {Mean (SD)} among Depressed males and females using unpaired t test**

## DISCUSSION

The mean hardiness score of females was 3.51 with SD of 5.142 and that of males was 6.28 with SD of 5.333. The difference in mean hardiness score of females and males was statistically significant ( $p < 0.001^{**}$ ), suggesting that in our study women were less resilient than men. This result was corroborated by a recent study by Patel A et al 2018 which revealed more women than men had difficulty in coping with stress of infertility treatment.<sup>[10]</sup> The majority of both female and male participants had moderately hardy personality (66.2% and 58.8% respectively). However 28% of males had hardy personality as compared to 11.9% of females and 21% of females had low hardy personality as compared

to 13.1% males. The difference in level of resilience of male and female participants was statistically significant ( $p < 0.001^{**}$ ). This highlights that more males were having hardy personalities as compared to female which suggests that males in our population were less likely to suffer psychological distress due to infertility treatment as compared to females.

It is reported in literature that women have higher level of neuroticism than men. Individuals with higher neuroticism are more vocal and attentive to their physical sensations than emotionally healthy people. It also makes them appraise an event in a more negative light than men.<sup>[11]</sup> On the contrary, hardy individuals are likely to perceive an event in a more desirable light and as being less disruptive to their lives than less hardy individuals.<sup>[12]</sup> So higher level of hardiness in men make them more resistant to psychological distress. Stress is known to have deleterious effect on immune system, so higher perceived stress in females, may increase likelihood of suffering from illness.<sup>[13]</sup> In context of infertility sociodemographic variables exert higher stress on females in comparison to males as infertility is still viewed as primarily associated with females and hamper the societal function expected of them. These findings are reflected in our study as men reported lower anxiety and depression scores than females. Among the 14 Coping Styles both female and male had similar pattern, predominantly utilized being Active coping, Positive reframing, Self-Distraction, Religion, Acceptance and Planning. Substance use, Humor, Self blame and Denial were the least utilised by both female and male participants. However statistically significant gender difference was evident in use of Instrumental support ( $p = 0.022$ ) and Acceptance ( $p = 0.031$ ) by female as compared to males.

Our result is contrary to finding of older studies by Jordan C et al<sup>14</sup> and Peterson C et al<sup>15</sup> which had found that females used more emotion-focused coping method in case of their infertility as compared to men.

Among Females, mean level of hardiness showed a bimodal peak at 25-29 years and 35-39 years, which was statistically significant ( $p=0.019^*$ ). Post hoc analysis by Tukey HSD revealed statistically significant difference exist between age group of 25-29 yrs with 30-34 yrs. Among Males, variance of mean level of hardiness with age was not statistically significant ( $p=0.248$ ).

Overall there was progressive increase in hardiness/resilience in females. However sudden dip in resilience in 30-34 could not be accounted for but it's effect were apparent in our study, as females of this age group also showed higher anxiety and depression as compared to preceding and subsequent age groups. Progressive increase in resilience with age is expected, as most people become more emotionally stable in mid-life (Roberts, Walton, & Viechtbauer, 2006).<sup>[16]</sup>

Most anxious females and males used similar coping strategies other than higher use of religion as coping mechanism by anxious female whereas anxious male would utilise positive reframing as prominent significant coping mechanism, ( $p<0.001^{**}$ ) and ( $p<0.014^*$ ) respectively. Among depressed males use humour ( $p<0.001^{**}$ ), venting ( $p<0.001^{**}$ ), and substance use ( $p<0.010^*$ ) was seen more commonly as compared to females who used positive reframing ( $p<0.008^*$ ) more commonly. In our study amongst anxious patients, whether male or female, both used similar coping mechanism beside religion which was used much more by females and positive reframing by males. Among depressed patients, the females used positive reframing much more commonly over males and males on the other hand used humor, venting and substance use, more regularly over females. It is evident that whether anxious or depressed, both females and males used predominantly emotion focussed coping mechanisms, which is contrary to finding by Jordan and Revenson (1999),<sup>[14]</sup> who had shown that infertile women rather tend to use more emotion-focused coping method as compared to men, but is in congruence with recent findings which suggest male or female use similar coping mechanism as shown by Ozkan S et al, 2015 17.

Anxious males use positive reframing coping mechanism more often than anxious females and the reverse is noted in depress cases where in depressed females cope more often by positive reframing than depressed males the differences being statistically significant. This incidental contradicting finding was rather surprising and difficult to explain in psychological terms an merits more attention in future studies and planned intervention.

## CONCLUSION

Inverse correlation of hardiness and severity of anxiety or depression gives us a unique opportunity to identify patients, who are less hardy and thus more likely to decompensate. Strengthening their coping and enhancing their resilience would have a primary preventive role. Psychological assessment and support should go hand in hand with ART treatment so as to improve mental health of infertile couples and perhaps even improve the chances of conception as reported in literature.

## REFERENCES

1. Pearlin L I, Schooler C, The structure of coping, Journal of Health and Social Behaviour, 1978 March , Vol 19: 2-21
2. Cabanyes Truffino J. Resilience: An approach to the concept. Revista de Psiquiatria y Salud Mental (English Edition). 2010;3(4):145-151
3. Ambriz G J et al. Psychological and social factors that promote Positive Adaptation to stress and Adversity in the Adult Life Cycle. Journal of Happiness Studies. 2012 Oct, 13(5): 833-843
4. Kausalya K, Sanjeeva Reddy N, Uma Maheshwara Reddy C, Jayashree K. Depression, anxiety and stress among infertile women and the impact of counselling on these levels. Innovative Journal of Medical and Health Science, 2013. 3(3): 110-112.
5. Carver CS. You want to measure coping but your protocol's too long: Consider the Brief COPE. International Journal of Behavioural Medicine.1997;4:92-100
6. Carver CS, Scheier MF, Weintraub JK. Assessing Coping Strategies: A Theoretically Based Approach. Journal of Personality and Social Psychology.1989; 56 (2): 267-83.
7. Kobasa, S. How much stress can you survive? American Health Magazine, 1984 September: 64-77.
8. Bartone PT. Predictors of stress-related illness in city bus drivers. J. of Occupational Medicine. 1989; 31: 657-663.
9. Bartone PT, Ursano RJ, Wright KW, Ingraham LH. The impact of a military air disaster on the health of assistance workers: A prospective study. J. of Nervous and Mental Disease. 1989; 177: 317-328.
10. Patel A, Sharma PS, Kumar P, Binu VS. Illness cognitions, anxiety, and depression in men and women undergoing fertility treatments: A dyadic approach. J Hum Reprod Sci. 2018;11:180-9.
11. Pottinger AM, McKenzie C, Fredericks J, DaCosta V, Wynter S, Everett D, et al. Gender differences in coping with infertility among couples undergoing counselling for in vitro fertilization treatment. West Indian Med J. 2006;55:237-42
12. Litt MD, Tennen H, Affleck G, Klock S. Coping and cognitive factors in adaptation to in vitro fertilization failure. Journal of Behavioral Medicine 1992;15:171-87.
13. Lewin-Epstein, N. (1989). Work characteristics and ill health: Gender differences in Israel. Work and Occupations, 16(1), 80-104
14. Jordan C, Revenson TA. Gender differences in coping with infertility: A Meta analysis. Journal of Behavior Medication1999; 23: 341-53.
15. Peterson C, Park N, Seligman M E P. Orientations to happiness and life satisfaction: The full life versus the empty life. Journal of Happiness Studies 2005; 6: 25-41
16. Roberts BW, Walton KE, Viechtbauer W. Patterns of mean-level change in personality traits across the life course: a meta-analysis of longitudinal studies. Psychol Bull. 2006 Jan;132(1):1-25.
17. Ozkan S, Karabulut A, Oğuz N, Sorkun HC.(2015) Coping with the Stress of Infertility. Males Versus Females. J Reprod Med. 2015 Jul-Aug;60(7-8):339-44.