Job Related Stress is The Source of Stress among Male Partner of Infertile Couples

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Abstract: Psychological stress is closely related to problem of infertility. The infertile couples may undergo stress from other sources also, which includes 'work related stresses' and 'family related stress'. To evaluate distribution and source of stress in 80 male partner of infertile couples, we assessed level of stress by using Hospital anxiety and depression score (HADS) questionnaire. Job-related, family related and fertility related stresses were assessed by using standard questionnaire. Serum cortisol was assayed by electrochemiluminescence based immunoassay. Sperm count was done as per WHO 2010 guideline. Thirty six (45%) of them had HADS total score more than 13. There was no significant rise in serum cortisol level in the patients having HADS more than 13. Total score of work related stress and fertility problem inventory were high and significantly correlated with HADS. There was no significant correlation between family related stress and HADS. Linear regression analysis shows that HADS had significant independent correlation only with work related stress. These results strongly suggest that work place is the source of stress among male partner of infertile couples. Stress might contribute to pathogenesis of male infertility. The attenuated cortisol response in these cases indicates a desensitization of HPA axis. Stress management to alleviate job related stress is warranted for the male partners of infertile couples.

Keywords: Male infertility, job stress, family related stress, fertility problem inventory, HADS.

1. INTRODUCTION

Infertility is defined as failure to conceive after one year of regular unprotected intercourse with the same partner. Male infertility is relatively less explored in comparison to female infertility. As per WHO study, incidence of infertility in India is 10 to 15% and about 30% of infertility is purely due to male causes. Thus a male factor plays a significant role in about 50% of infertile couples [1].

Psychological stress is closely related to problem of infertility. Anxiety and depression are associated with stress. The stress in infertile couples might be due to infertility. They may undergo stress from other sources also, which includes 'work related stresses and 'family related stress' [2, 3, and 4].

There are various tools to evaluate stress. The 'Hospital anxiety and depression scale (HADS)' is a useful tool for the evaluation of levels of anxiety and depression in patients who are treated in the departments other than psychiatry [5, 6]. Many studies have used HADS to evaluate stress in infertile male subjects [7, 8].

There are reports indicating that infertility leads to stress [9] and stress can cause male infertility [10, 11]. As a couple fails to achieve the expected goal of reproduction, the feelings of frustration and disappointment raise stress, requiring prolonged efforts to conceive [12]. 'Fertility problem inventory (FPI)' is the most comprehensive approach and has been widely used for the assessment of infertility adjustment/research [4].

Although fertility problem inventory covers some of the family related stress questionnaire associated with the infertility, it doesn't evaluate family related stress in detail. 'Finding stone counselling center' designed a detailed questionnaire for evaluating family related stress [13]. Although less widely used, it appears to be a thorough questionnaire exploring each and every aspect of family related stress.

The job related stress is associated with the infertility. A study shows that the job related stress can affect the male semen quality which can lead to infertility [11, 14]. In addition, psychosocial stress at work in married men and their spouses leads to prolonged time to pregnancy [15]. Moreover, numerous studies have tried to establish relation between job

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related stress symptoms and individual'sdegradation of general health. For example, one of the study tried explaining the mechanisms of how psychosocial factors may cause musculoskeletal pain [16]. The 'Health and Safety Executive (HSE) indicator tool' [17] is one of commonly used tools for assessing the risk of work-related stress. The validity of the HSE indicator tool is well established [18].

Cortisol has been designated as the stress hormone in human. Besides the psychological scoring through questionnaires, serum cortisol in human is considered as a laboratory marker of stress [19]. There are studies that have used cortisol as a stress marker in various illnesses [20, 21]. Also, there are studies that have used cortisol for evaluating stress in infertility cases [22, 23].

The distribution of different source of stress and their impact on fertility has not been fully evaluated. Therefore, the present study was designed to evaluate (a) distribution of stress and (b) source of stress in male partner of infertile couples.

2. METHODS

2.1. Study Subjects

In our study, eighty male partners of infertile couples (age range: 26-42) residing in Delhi were recruited from Fertility and IVF Clinic, LokNayak Hospital, New Delhi. All of them had primary infertility. The subjects were incorporated in this study after obtaining their written consent. It was a hospital based descriptive (observational) study and was approved by institutional ethical committee of Maulana Azad Medical College, New Delhi.

2.2. Administering HADS

The subjects were evaluated for level of stress using HADS questionnaire. HADS is a 14 item screening scale that was originally developed to indicate the possible presence of anxiety and depression states (in patients with age of 16-65years) in a medical (outpatient clinic) setting [24]. It contains two 7 item scales, one for anxiety and the other for depression. Each item in both scales has a range from 0 to 3. A cutoff of total score of 13 was found to be optimally sensitive (79%) and specific (77%) for screening the stress-associated psychological disturbances [25]. The participants were exposed to the standard questionnaire of HADS for the evaluation of anxiety and depression. The HADS questionnaire was translated to local language and validated. In the present study, HADS was administered in the form of a structured interview as many of the participants had difficulty in reading and comprehending even the translated version of self-rating HADS questionnaire. The person recording the HADS score was trained by a psychiatrist. For performing a quality check on the HADS score data, the scores of 12 randomly selected subjects was cross-checked on the same day by an expert without the knowledge of the interviewer.

2.3. Administering Family Related Stress Questionnaire

This family related stress questionnaire consists of 21 items on a 4 point likert scale ranging from 1(never) to 4 (always). It was modified by us to make it suitable for primary infertility cases. Six questions (2 even and 4 odd) were deleted as they were not relevant for primary infertility cases and in the present study only primary infertility cases were recruited. These questions were suitable for people who already have children. Scores were proportionately decreased for interpreting the outcome of questionnaire. This was administered by personal interview. The quality check was done as mentioned above for HADS. The interpretation of score as modified by us is done as mentioned below:

Score	Interpretation
21 and greater for odd-numbered or 13 and less for even-numbered questions	Family has good skills and attitudes to handle life's stress
16-20 for odd-numbered or 14-19 for even-numbered questions	Practice good skills and positive attitudes to create harmony at home
11-15 for odd-numbered or 20-25 for even-numbered questions	There are many stresses, need to think about ways to improve
10 or less for odd-numbered or 26 and greater for even-numbered questions	Taking action is now important for family's health and happiness

2.4. Administering Fertility Related Stress Questionnaire

In this 46 item scale, participants were asked to rate how much they agree or disagree with fertility-related concerns or beliefs and responses are given in a Likert-type format, ranging from 0 (strongly disagree) to 6 (strongly agree). It was translated to local language and validated. It consists of five main different domains:

social concern, sexual concern, relationship concern, need for parenthood and rejection of childfree lifestyle, all of those contributing to the assessment of overall infertility stress. A high score means high distress caused by infertility. This was also administered through personal interview and the quality was checked.

2.5. Administering Job Related Stress Questionnaire

The 39 items with seven factor "Health and Safety Executive Management Standards" (HSE MS) indicator tool was used to assess patient's work-related stress. It consists of 8 items for demands, 7 for control, 9 for support (5 for managerial support, 4 for colleague support), 7 for relationships, 5 for role and 3 for change. The questionnaire was translated to local language and validated. Through personal interview, respondents were asked on one of two 5-point scales the questions (1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Often, 5 = Always, or 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree). This 5- point scoring system increases with how comfortable person is at his work. So more was the score, more was the comfort level. In the present study, to calculate the work related stress level the score was reversed in each case after the interview. Now if the score is more, more is the work related stress level.

2.6. Sample Collection

After the interview, 5ml of fasting blood sample was collected in a polypropylene tube at 9-10 a.m. It was centrifuged at 3000g for 5min and the supernatant was stored at -80^{o}C until analysis. Semen was collected by masturbation by subject after 2-6 days of abstinence and ejaculated into a wide mouthed plastic container.

2.7. Assessment of Serum Cortisol

The subject's identity, their HADS and other scores were not revealed to the person performing the hormone assay. Serum cortisol was assayed by competitive electrochemiluminiscence based immuno-assay using commercially available kit from Roche diagnostics India private limited, Mumbai, India adapted to ELECSYS 2010. Manufacturer instructions were followed to perform these assays.

2.8. Sperm Count

Semen analysis and sperm count was performed as per WHO guideline (2010). For calculating sperm concentration, well mixed liquefied semen was suitably diluted with fixative and mounted in a 100µm-deep hemocytometer chamber. At least 200 intact spermatozoa per replicate were counted. Total number of sperms per ejaculate was calculated by multiplying sperm concentration with semen volume. Total sperm number ≤ 39 x 10^6 per ejaculate was considered as low or abnormal sperm count.

2.9. Statistical Analysis

Data was presented as median and range. Comparison of data was done by Mann Whitney U test. Correlation coefficient was calculated by spearman correlation analysis. Linear regression analysis was done for determining independent effect of one parameter in presence of another parameter. Odds ratio was calculated to evaluate the risk of oligospermia in stress. A P value < 0.05 was considered as statistically significant in all analysis. All data were analyzed by SPSS software version 16 for Windows (SPSS Inc., Chicago, USA).

3. RESULTS

The age range of the population was 25-45 years and 99% of them were in the peak fertility period i.e. between 25-40 years. They were suffering from infertility for more than 2 years. All of these cases belong to primary infertility group. No secondary infertility case was included in our study.

Median of HADS total score of the sample population were 13 (range: 4-36). Median of HADS anxiety score were 4 (range: 0-17) and that of HADS depression score were 8 (range: 0-20). Thirty six (45%) of the sample population had total HADS score more than 13. Fifty five percent of them had anxiety score between 0-7, while the rest had HADS anxiety score 8 or above. Thirty one (38%) of the population had depression score less than 7 but others (62%) had depression score 8 or above.

In our study, median score of odd and even questions of the questionnaire to explore family related stress were 23 and 17 respectively (Table **1**) and their range was 19-26 and 11-24 respectively. Table **2** shows 74 people out of 80 had score 21 and above while 6 have score between 16-20 for odd questions. Sixty three persons had score of below 20 for the even questions. The score from odd and even questions did not correlate with total HADS (Table **3**).

Similarly as shown in Table **1**, median of stress score due to demands, control, managerial support,

Table 1: Median and Range of Score of the Components of Family Related Stress, Job Related Stress Score and Fertility Problem Inventory in Study Population (n = 80)

Family related stress score	Odd questions	23 (19-26)
	Even questions	17 (11-24)
Work related stress score	Demands	28 (14-39)
	Control	22.5 (11-32)
	Managerial support	12 (1-25)
	Peer support	7 (1-19)
	Relationship	15 (0-31)
	Role	8 (5-18)
	Change	7 (0-15)
	Total	95 (34-173)
Fertility problem inventory Score	Social concern	23 (10-44)
	Sexual concern	10 (8-21)
	Relation	15 (10-24)
	Rejection of childhood	37.5 (22-47)
	Need for parenthood	48.5 (37-73)
	Total	134 (111-165)

Table 2: Distribution of Study Population on the Basis of Different Components of Family Related Stress

Score of Odd Questions	Distribution (n = 80)	Score of Even Questions	Distribution (n = 80)
21 and above	74 (92.5%)	13 and less	5 (6.25%)
16-20	6 (7.5%)	14-19	58 (72.5%)
11-15	0 (0%)	20-25	17 (21.25%)
10 or less	0 (0%)	26 and above	0 (0%)

Table 3: Correlation of HADS Score with Family Related Work Related and Fertility Related Stress Scores in the Study Population (n = 80)

		HADS Total Score	HADS Anxiety Score	HADS Depression Score
Family related stress score	Even questions	0.03	-0.02	0.06
	Odd questions	-0.15	-0.24*	-0.07
Work related stress score	Demands	0.48$^{\Psi}$	0.46$^{\Psi}$	0.43$^{\Psi}$
	Control	0.42$^{\Psi}$	0.49$^{\Psi}$	0.34$^{\Psi}$
	Managerial support	0.47$^{\Psi}$	0.54$^{\Psi}$	0.39$^{\Psi}$
	Peer support	0.39$^{\Psi}$	0.40$^{\Psi}$	0.34$^{\Psi}$
	Relationship	0.40$^{\Psi}$	0.44$^{\Psi}$	0.36$^{\Psi}$
	Role	0.37$^{\Psi}$	0.44$^{\Psi}$	0.31$^{\Psi}$
	Change	0.37$^{\Psi}$	0.43$^{\Psi}$	0.35$^{\Psi}$
	Total	0.44$^{\Psi}$	0.49$^{\Psi}$	0.39$^{\Psi}$

Table 3 cotinue...

		HADS Total Score	HADS Anxiety Score	HADS Depression Score
Fertility problem inventory score	Social concern	0.11	0.07	0.04
	Sexual concern	-0.02	0.05	-0.09
	Relation	0.14	0.21	0.08
	Rejection of childhood	0.09	-0.02	0.09
	Need for parenthood	0.33ᵠ	0.29ᵠ	0.28*
	Total	0.23*	0.19	0.14

ᵠP value of correlation coefficient is significant at the 0.01 and * at the 0.05 level.

peer support, relationship, role and change as assessed from work related questionnaire were 28, 22.5, 12, 7, 15, 8 and 7 respectively. Their ranges were 14-39, 11-32, 1-25, 1-19, 0-31, 5-18 and 0-15 respectively. Total score and score of components of job related stress were significantly correlated with total HADS and anxiety and depression scores of HADS (Table **3**).

Table **1** also shows that the median of total score and score of the components of fertility problem inventory were not high except for the need for parenthood. Total score of FPI questionnaire significantly correlated with total HADS. The score from the questions assessing need for parenthood correlated significantly with total HADS and anxiety and depression score component of HADS (Table **3**).

The Table **4** shows that by linear regression model when HADS total score is considered as dependent variable and family related, work related and fertility problem inventory score as independent variable, HADS total score had significant independent correlation only with work related stress in the study population.

Table 4: Coefficient, Intercept and Significance of Linear Regression Taking HADS Score as Dependent Variable and Family Stress Score (Odd and Even), Work Related Stress Score and Fertility Problem Inventory Score as Independent Variables in the Study Population (n = 80)

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.39	19.73		0.07	0.94
	Family stress score odd	-0.52	0.59	-0.09	-0.89	0.38
	Family stress score even	-0.05	0.33	-0.01	-0.15	0.89
	Work related stress score	0.10	0.03	0.40	3.87	0.00
	Fertility problem inventory score	0.12	0.09	0.15	1.41	0.16

Dependent Variable: HADS total score.

Table 5: 2X2 Table Showing Distribution of Stress and Oligospermia in Study Population (n = 80)

	Stress + ve (HADS > 13)	Stress – ve (HADS ≤ 13)
Oligospermia + ve (Sperm count ≤ $39X10^6$ per ejaculate)	28	10
Oligospermia – ve (Sperm count > $39X10^6$ per ejaculate)	8	34

Odds ratio to calculate the risk of stress for development of oligospermia was 11.9 (CI: 4.14-34.20, $p < 0.0001$).

Table **5** shows the distribution of stress and oligospermia in the study population. To evaluate the risk of oligospermia in stress, odds ratio was calculated to be 11.9 (CI: 4.14-34.20, p < 0.0001). Sperm count was significantly lower (p = < 0.01, median 30 million, range: 0-110) in persons who has HADS > 13 than those who had HADS ≤ 13 (median 67 million, range: 20-140).

4. DISCUSSION

Thirty six (45%) of the study population had HADS total score more than 13 indicating that they had significant stress in their life, as 13 is considered to be the optimum cut off to determine stress. So from this cross sectional study, it may be concluded that a significant proportion of male partner of infertile couples undergo significant stress in life.

In our study, median score of odd and even questions of the questionnaire to explore family related stress were 23 and 17 respectively (Table **1**) and 21.25% of them had mild family related stresses who need to improve upon their skill to manage them (Table **2**). It indicates that the majority of the subjects included in the study had a very good skills and attitude to handle stress and they had positive attitude to create harmony at home. None of them had severe family related stress which needs intervention for family's health and happiness. The score of odd questions of family related stress questionnaire correlated significantly with HADS anxiety score (Table **3**). However, there was no significant correlation between total HADS and scores of family related stress. It indicates that family related stress is not a significant contributor of stress in the study population.

Similarly when FPI questionnaire was analyzed, the medians of score of social concern, sexual concern, relationship, rejection of childhood and need of parenthood were 23, 10, 15, 37.5, 48.5 and 134 respectively (Table **1**). Unlike HADS there is no cut off to interpret FPI score. However, the score of the component 'need of parenthood' was high and correlated significantly with total HADS and anxiety and depression score of HADS. It indicates that they are probably concerned for their need of parenthood. Total FPI score was also high and correlated significantly with HADS (Table **3**). This indicates that infertility related problems might contribute to stress in the male partner of infertile couples.

The medians of score due to demands, control, managerial support, peer support, relationship, role and change as assessed from work related questionnaire were 28, 22.5, 12, 7, 15, 8 and 7 respectively (Table **1**). Unlike HADS, for score of work related questionnaire also there is no cut off to differentiate persons having and the persons not having work related stress. But high median scores of total and the components of work related stress evaluation are indicative of presence of work related stress in the study population. Total score of work related stress correlated with total HADS, HADS anxiety score and HADS depression score (Table **3**). The components of work related stress i.e. demands, control, managerial support, peer support, relationship, role and change also correlated with HADS total, anxiety and depression score (Table **3**). This indicates that work related stress is a major source of stress in male partner of infertile couples. Our finding corroborates other studies showing significant relation between work-related stress and male infertility [11]. There is need to improve upon all seven components in work place to alleviate work related stress.

A linear regression model considering HADS total score as dependent variable and family related stress score, work related stress score and fertility problem inventory score as independent variable showed that only work related stress significantly correlated with HADS total score (Table **4**). Hence, it can be concluded that work related stressor is the major contributor of stress among the male partners of infertile couples.

It is seen that the sperm count in group having HADS more than 13 is significantly lower than that of group having HADS less than 13. Twenty eight persons among 36 who had HADS more than 13 were found to be oligospermic, whereas only 10 persons among 44 who had HADS less than 13 were oligospermic. Significant high odds ratio indicates that stress is a risk factor for development of oligospermia (Table **5**). Our finding corroborates other studies showing significant relation between HADS and male infertility [5, 10]. So it implicates that stress might attribute to male infertility.

Cortisol is considered as a one of the stress marker which rises in stress because of HPA axis activation. Serum cortisol level did not increase in group having HADS more than 13. There was no correlation between serum cortisol and HADS. Although 19 persons had serum cortisol level above the reference range, in the present study the rise in serum cortisol was not consistent in stress. In other studies also, the cortisol hypothesis has been challenged. Hyporesponsiveness of HPA axis under emotional stress in patients with panic disorder has been reported [26]. Similarly there are reports that indicate that there is desensitization of HPA axis in chronic stress [27]. In our study also

majority of the patients were suffering from chronic stress. Probably the prevailed chronic stress leads to desensitization of HPA axis. Hence we didn't find a significant rise in cortisol level of the patients who had HADS more than 13 and because of the desensitization there was hardly any difference in the serum cortisol level of the stressed and the non-stressed group. However measurement of stress hormone following a stressor challenge could throw more light in this direction.

Psychological stress is a risk factor for male infertility. Work place is major source of stress among male partner of infertile couples. However due to limited data on this issue, future longitudinal studies are required to confirm the results. Stress management particularly at the work place is warranted for the male partners of infertile couples.

KEY POINTS

- The infertile couples undergo psychological stress and stress from other sources also, which includes 'work related stresses' and 'family related stress'.
- Work place is major source of stress among male partner of infertile couples based on the study.
- Future research needs to address stress management and counselling of infertile couples.

CONFLICTS OF INTEREST

There was no funding provided for the study. There are no conflicts of interest. The part of the work was presented in Conjoint Meeting of the International Federation of Fertility Societies and the American Society for Reproductive Medicine *October 12-17, 2013,* Boston, USA.

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