

# Anxiety in men undergoing different stage of infertility in China: Stage of diagnostic investigation and stage of ART treatments

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## Abstract

The purpose of the present study was to investigate the prevalence of anxiety and risk factors associated with anxiety in men undergoing diagnostic investigation for infertility and assisted reproductive technology (ART) treatments in China. The anxiety score was compared for 167 men undergoing diagnostic investigation and 844 men undergoing ART treatments. We found that men undergoing diagnostic investigation were more anxious than men undergoing ART treatments. The prevalence of anxiety in both groups were different, however they share the same risk factors associated with anxiety, such as financial burden of treatment and history of ejaculation failure. In conclusion, men undergoing diagnostic investigation may experience anxiety that currently may be overlooked by healthcare professionals. A greater understanding of the risk factors that contribute to anxiety during diagnostic investigation could help healthcare professionals to identify those male patients in greater need of psychological support and plan an adequate therapeutic strategy.

## Introduction

According to the World Health Organization (WHO), 8–10% of couples experience difficulties in conceiving [1]. The prevalence of infertility in China was 7–10% [2] and the number of patients exceeded 40 million. Several recent studies emphasize an increase in infertility rate [3,4]. Besides being a medical condition in itself, infertility has a significant impact on people's well-being and quality of life [5–8]. It has been ranked as one of the great stressors in life with psychological, social and cultural consequences [9]. People experiencing fertility problem are almost twice as likely to suffer from anxiety than the general population. Anxiety significantly affect the quality of life of infertile couples [10,11] and their ability to cope with infertility treatment, pregnancy, and parenting [12,13]. It sometimes becomes a clinically important problem in its own right, and deserves more clinical attention.

Infertility is associated with psychological distress for both women and men [14]. Most infertility studies are focused on women [15]. In recent years, there is an increase in the number of studies on men's experiences of infertility [16]. Still, these studies only focus on the anxiety of men preparing [17,18] or undergoing assisted reproductive treatment (ART) [19]. However, infertility process from suspicion to diagnostic investigation then treatments often endures over a long period of time. Infertile couples may experience anxiety in different situations as while undergoing a screening test, waiting for the results, received a diagnosis and undergoing treatment. It is therefore important to study the anxiety of men undergoing diagnostic investigation. To our knowledge, this issue has not been explored in depth, especially in China.

So, the purpose of this article is 1) to study and compare the prevalence of anxiety in men undergoing infertility diagnostic investigation and ART treatments in China. 2) to explore risk factors

associated with anxiety in both groups. 3) to compare risk factors associated with anxiety in men undergoing diagnostic investigation and ART treatments in China.

## Materials and methods

### Study population

All male patients from June to October in 2011 visited assisted reproductive department of ZhongNan Hospital and Tongji Hospital (two of the top four university-affiliated hospitals in Wuhan, China) were invited to join this study. The exclusion criteria were unwillingness to participate, having a diagnosis of hypertension/diabetes, or patients currently taking antidepressants, antipsychotics or antihypertensives drugs. During this period, 1105 male eligible patients were asked to enroll in this study, and 18 of them were excluded as they did not wish to take part in the study. We obtained 1087 questionnaires, in which 76 (7.0%) questionnaires were discarded due to incompleteness. In total, 1011 (91.5%) filled questionnaires were used in the analysis.

### Procedure

Ethical approval was granted by the university review board and informed consent was obtained from all participants.

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They were divided into two groups:

1) male patients undergoing diagnostic investigation for infertility: All eligible male patients without a confirmed diagnosis at the initial patient consultation.

2) male patients receiving ART treatments: All eligible male patients who has been recently prescribed of ART treatments.

Eligible participants were asked to complete the State-Trait Anxiety Inventory (STAI) and the demographic questionnaire as mentioned below, during the waiting time before the semen sample collection on the day of semen examination or operation for IUI and IVF.

Main outcome measure

The STAI was used to assess the levels of anxiety of the men who participated in this study [20]. The STAI is one of the most reliable instruments for measuring anxiety in adults. It differentiates between temporary and longstanding states [21] of anxiety and has been previously used to study the anxiety of patients undergoing ART treatments [17,18,22,23]. The STAI is comprised of two separate scales. The state scale (S-AI) which measures the degree of anxiety at a particular given time, identifies a transitory emotional state that is characterized by subjective, consciously perceived feelings of tension, apprehension and anxiety. The trait scale (T-AI) which assesses the tendency of an individual to respond to stressful circumstances with raised anxiety, identifies relatively stable individual differences in anxiety proneness. It reflects the consistent or usual anxiety state of the subjects. The state scale and trait scale use a scoring system (ranges 20-80). The generalized cutoff scores were 43 and 45 for T-AI and S-AI respectively [24].

### Factors studied

A demographic questionnaire was designed to the following information: age, BMI, education background, smoking, duration of marriage, duration of infertility, cause of infertility, history of ejaculation failure and financial burden of current treatment.

In our study, the man with the following situations during his semen sample collection was identified an having ejaculation failure: masturbation over 30 minutes, needing his wife to help, sexual intercourse with a non-toxic condom, requiring sildenafil treatment to obtain his sperm sample.

### Data analysis

All statistical analyses were carried out using the Statistical Package for Social Sciences (SPSS, version 13) for Windows. Descriptive analysis was conducted to ascertain demographic characteristics of the study population. Chi-square-test was used to compare the prevalence of anxiety for men in both groups. Logistic regression was used to determine which variables are associated with state anxiety and trait anxiety, to calculate odds ratios and 95% confidence interval for risk factors. P value of <0.05 was considered statistically significant.

### Result

Completed questionnaires from 1011 men were collected from both groups: diagnostic investigation group (n=167) and ART treatments group (n=844). The mean age of the study population was 33.27 years (SD=5.16), BMI<25, mostly having a history of infertility for 1-6 years,

and married for 1-6 years. The characteristics of men in both groups were shown in Table 1.

### Prevalence of state anxiety and trait anxiety in men during diagnostic investigation and undergoing ART treatments

As seen in Table 2, 14.4% of diagnostic investigation group and 7.7% of ART treatments group had state anxiety symptoms. 11.4% of diagnostic investigation group and 5.5% of ART treatments group had trait anxiety symptoms. Statistically significant differences were found between diagnostic investigation groups and ART treatments groups in both state anxiety and trait anxiety prevalence (P<0.01).

### Risk factors associated with state anxiety of diagnostics investigation group and ART treatments group

For men undergoing ART treatments, the risk factors independently associated with state anxiety were financial burden of treatment (OR=0.53, 95% CI=0.36-0.79), and history of ejaculation failure (OR=0.47, 95% CI=0.25-0.89).

**Table 1.** Demographic and clinical characteristics of the participants

|  | Diagnostic group<br>N=167 (%) | Treatment group<br>N=844 (%) | Total<br>N=1011 (%) |
|--|-------------------------------|------------------------------|---------------------|
| <b>Age</b>                               |                               |                              |                     |
| Mean                                     | 30.77                         | 33.77                        | 33.27               |
| Std.Deviation                            | 4.89                          | 5.07                         | 5.16                |
| <b>BMI</b>                               |                               |                              |                     |
| Mean                                     | 23.54                         | 23.72                        |                     |
| Std.Deviation                            | 3.07                          | 4.85                         |                     |
| <b>Education</b>                         |                               |                              |                     |
| Primary                                  | 3 (1.8)                       | 23 (2.7)                     | 26 (2.6)            |
| Junior middle                            | 51 (30.5)                     | 273 (32.3)                   | 324 (32)            |
| Senior                                   | 43 (25.7)                     | 210 (24.9)                   | 253 (25)            |
| Junior college                           | 32 (19.2)                     | 154 (18.2)                   | 186 (18.4)          |
| Higher education                         | 38 (22.8)                     | 184 (21.8)                   | 222 (22)            |
| <b>Duration of married</b>               |                               |                              |                     |
| 0-3 years                                | 108 (64.7)                    | 261 (30.9)                   | 369 (36.5)          |
| 3.1-6years                               | 30 (18)                       | 304 (36)                     | 334 (33)            |
| 6.1-12years                              | 20 (12)                       | 224 (26.5)                   | 244 (24.1)          |
| 12.1-15years                             | 2 (1.2)                       | 27 (3.2)                     | 29 (2.9)            |
| ≥15years                                 | 7 (4.2)                       | 28 (3.3)                     | 35 (3.5)            |
| <b>Duration of infertility</b>           |                               |                              |                     |
| 0-3years                                 | 130 (77.8)                    | 326 (38.6)                   | 456 (4.1)           |
| 3.1-6years                               | 23 (13.8)                     | 301 (35.7)                   | 324 (32)            |
| 6.1-12years                              | 12 (7.2)                      | 188 (22.3)                   | 200 (19.8)          |
| 12.1-15years                             | 2 (1.2)                       | 16 (1.9)                     | 18 (1.8)            |
| ≥15years                                 | 0                             | 13 (1.5)                     | 13 (1.3)            |
| <b>Smoking</b>                           |                               |                              |                     |
| Yes                                      | 95 (56.9)                     | 390 (46.2)                   | 485 (48)            |
| No                                       | 72 (43.1)                     | 454 (53.8)                   | 526 (52)            |
| <b>Cause of infertility</b>              |                               |                              |                     |
| Female factor                            | 21 (12.6)                     | 379 (44.9)                   | 400 (39.6)          |
| Male factor                              | 5 (3)                         | 123 (14.6)                   | 128 (12.7)          |
| Both female and male factor              | 5 (3)                         | 133 (15.8)                   | 138 (13.6)          |
| unexplained                              | 136 (81.4)                    | 209 (24.8)                   | 345 (34.1)          |
| <b>History of ejaculation failure</b>    |                               |                              |                     |
| Yes                                      | 10 (6.0)                      | 117 (13.9)                   | 127 (12.6)          |
| No                                       | 157 (94)                      | 727 (86.1)                   | 884 (87.4)          |
| <b>Financial burden of the treatment</b> |                               |                              |                     |
| Mild                                     | 89 (53.3)                     | 219 (25.9)                   | 308 (30.5)          |
| Moderate                                 | 54 (32.3)                     | 438 (51.9)                   | 492 (48.7)          |
| Sever                                    | 24 (14.4)                     | 187 (22.2)                   | 211 (20.9)          |

In comparison, the risk factor independently associated with state anxiety was only history of ejaculation failure (OR=0.17, 95% CI=0.04-0.78) for men undergoing diagnostic investigation (Table 3).

**Risk factors associated with trait anxiety of diagnostics investigation group and ART treatments group**

For men undergoing ART treatments (OR=0.53, 95% CI=0.33-0.84) and diagnostic investigation (OR=0.38, 95% CI=0.17-0.84), the risk factor independently associated with trait anxiety was the same: financial burden of the treatment (Table 4).

**Table 2.** Compare with prevalence of state anxiety and trait anxiety in men undergoing diagnostic investigation and ART treatments

|                                | Anxiety N (%) | not anxiety N (%) | X <sup>2</sup> | P     |
|--------------------------------|---------------|-------------------|----------------|-------|
| S-AI                           |               |                   |                |       |
| Diagnostic investigation group | 24 (14.4)     | 143 (85.6)        | 7.73           | 0.005 |
| ART treatment group            | 65 (7.7)      | 779 (92.3)        |                |       |
| T-AI                           |               |                   |                |       |
| Diagnostic investigation group | 19 (11.4)     | 148 (88.6)        | 8.14           | 0.004 |
| ART treatment group            | 46 (5.5)      | 798 (94.5)        |                |       |

**Table 3.** Risk factors were associated with state anxiety in different groups

|  | Diagnostic Investigation group |           |      | ART Treatments group |            |      |
|--|--------------------------------|-----------|------|----------------------|------------|------|
|  | OR                             | 95% CI    | P    | OR                   | 95% CI     | P    |
| <b>Age</b>                               | 1.04                           | 0.92-1.19 | 0.53 | 0.98                 | 0.92-1.04  | 0.50 |
| <b>BMI</b>                               | 1.02                           | 0.88-1.18 | 0.81 | 1.02                 | 0.93-1.10  | 0.73 |
| <b>Education</b>                         | 0.95                           | 0.61-1.46 | 0.81 | 0.93                 | 0.73-1.18  | 0.54 |
| <b>Duration of married</b>               | 1.02                           | 0.47-2.21 | 0.96 | 1.06                 | 0.68-1.65  | 0.82 |
| <b>Duration of infertility</b>           | 1.17                           | 0.39-3.48 | 0.78 | 0.91                 | 0.572-1.44 | 0.68 |
| <b>Cause of infertility</b>              |                                |           | 0.94 |                      |            | 0.52 |
| female                                   | ref                            |           |      |                      |            |      |
| male infertility                         | 1.29                           | 0.29-5.71 | 0.74 | 1.33                 | 0.71-2.50  | 0.38 |
| both female and male                     | 0.53                           | 0.04-6.45 | 0.62 | 1.96                 | 0.74-5.23  | 0.18 |
| unexplained                              | 6E+00                          | 0.00      | 1.00 | 1.04                 | 0.48-2.25  | 0.93 |
| <b>Smoking</b>                           | 1.37                           | 0.54-3.53 | 0.51 | 1.37                 | 0.82-2.30  | 0.24 |
| <b>History of ejaculation failure</b>    | 0.17                           | 0.04-0.78 | 0.02 | 0.47                 | 0.25-0.89  | 0.02 |
| <b>Financial burden of the treatment</b> | 0.62                           | 0.31-1.23 | 0.17 | 0.53                 | 0.36-0.79  | 0.00 |

**Table 4.** Risk factors were associated with trait anxiety in different groups

|  | Diagnostic Investigation group |           |      | ART Treatments group |           |      |
|--|--------------------------------|-----------|------|----------------------|-----------|------|
|  | OR                             | 95.0% CI  | P    | OR                   | 95% CI    | P    |
| <b>Age</b>                               | 1.1                            | 0.92-1.24 | 0.37 | 1.00                 | 0.93-1.08 | 0.97 |
| <b>BMI</b>                               | 1.1                            | 0.92-1.30 | 0.32 | 1.03                 | 0.93-1.14 | 0.61 |
| <b>Education</b>                         | 1.0                            | 0.57-1.58 | 0.85 | 1.09                 | 0.82-1.44 | 0.58 |
| <b>Duration of married</b>               | 0.7                            | 0.34-1.63 | 0.46 | 1.01                 | 0.58-1.75 | 0.97 |
| <b>Duration of infertility</b>           | 0.9                            | 0.32-2.31 | 0.77 | 0.85                 | 0.49-1.48 | 0.56 |
| <b>Cause of infertility</b>              |                                |           | 0.96 |                      |           | 0.50 |
| female                                   | ref                            |           |      |                      |           |      |
| male infertility                         | 1.00                           | 0.24-4.13 | 1.00 | 1.46                 | 0.69-3.12 | 0.33 |
| both female and male                     | 0.49                           | 0.04-6.24 | 0.58 | 1.65                 | 0.56-4.92 | 0.37 |
| unexplained                              | 6E+00                          | 0         | 1.00 | 0.87                 | 0.37-2.08 | 0.76 |
| <b>Smoking</b>                           | 1.01                           | 0.35-2.87 | 0.99 | 0.94                 | 0.51-1.73 | 0.84 |
| <b>History of ejaculation failure</b>    | 0.22                           | 0.04-1.10 | 0.07 | 0.76                 | 0.34-1.68 | 0.50 |
| <b>Financial burden of the treatment</b> | 0.38                           | 0.17-0.84 | 0.02 | 0.53                 | 0.33-0.84 | 0.01 |

**Discussion**

Notwithstanding the growing body of literature addressing infertile males' experiences [15], anxiety of infertile men undergoing different stage of infertility continue to be underrepresented and understudied. Thus, the aim of the present study was to explore prevalence of anxiety in men undergoing infertility diagnostic investigation and ART treatments, with a particular focus on comparing the prevalence of anxiety and risk factors associated with anxiety symptoms. Several main findings emerged from the present research.

Firstly, men undergoing diagnostic investigation scored higher in both state anxiety and trait anxiety than men undergoing ART treatments. It is commonly known that patients undergoing ART treatments experience multidimensional stress from the treatment itself and have lower quality of life [25]. Anxiety are highly prevalent among men undergoing ART treatments [26,27]. So, these patients in general already receive psychological support from the fertility clinics. However, patient's experience of infertility from suspicion to diagnostic investigation and treatments often endures over a long period of time. It is not just a stage of treatment. We therefore need to understand anxiety in men undergoing different stage of infertility. This is the first study, according to our knowledge, to describe the prevalence of anxiety in men undergoing diagnostic investigation in China. Our study found that men undergoing diagnostic investigation are more anxious (both state anxiety and trait anxiety) than men undergoing ART treatments. Men undergoing diagnostic investigation have a high prevalence of anxiety (14.4%), that could due to uncertainty about cause of infertility, treatment cost, duration and side effects [28]. This finding suggests that we should pay more attention to men undergoing diagnostic investigation and give appropriate psychological support.

Secondly, the prevalence of anxiety was compared with studies from other countries. Because there was no study reported the prevalence of anxiety in men undergoing diagnostic investigation, a direct comparison is not feasible. For men undergoing ART treatments (such as IVF or ICSI), the prevalence of was reported to be 4.5% [26] in Italy, 4.9% in Sweden [27] and 12.0% in Tunisia [14]. The prevalence of anxiety in China was slightly higher than that in Italy and Sweden, but lower than that in Tunisia. Different culture background and ethnicity might contribute to the difference in the prevalence reported in other countries.

Additionally, although the prevalence of anxiety between the diagnostic investigation group and ART group was significantly different, the associated risk factors were similar. For the men undergoing diagnostic investigation and ART treatments, the same risk factor identified independently associated with state anxiety was history of ejaculation failure. It portended 0.17 and 0.47 elevated risks for state anxiety to men undergoing diagnostic investigation and undergoing ART in our study respectively. The history of ejaculation failure had a greater impact on anxiety of men undergoing ART treatments than men undergoing diagnostic investigation. Experiencing ejaculation failure was a stressful life event for males. Many men think this is related to his dignity. Especially for men undergoing ART treatments, it would be a catastrophic event if he cannot obtain his semen on the day of operation. Emery et al. found that 1/5 of the male patient with ejaculation failure on the day of oocyte retrieval for IVF presented an anxio-depressive episode necessitating psychiatric hospitalization 1 week later [29]. It is necessary to study further on how to help men with history of ejaculation failure.

Financial burden of the treatment was also the common risk factor identified independently associated with state anxiety for men

undergoing diagnostic investigation and ART treatments. The heavier the financial burden of treatment they felt, the more prone to anxiety they are. This result was consistent with previous studies that reported economic factor was the risk for anxiety [30,31]. Financial problems can increase stress and patients with low income or financial problems have a high risk for anxiety. Fortunately, appropriate psychological treatment could reduce anxiety scores among low-income infertile couples [32].

The present research confirmed the need to widen psychological care to patients undergoing diagnostic investigation for infertility. However, it is to be noted that not all men required such care. During diagnostic investigation, male patients would benefit from undergoing a routine screening for factors that may increase their risk of anxiety, such as history of ejaculation failure and financial burden of the treatment as reported in this study. The males identified most in need by the routine screening should receive appropriate psychological support. In addition, as the findings of previous research [33,34] highlighted men's desire to appear strong in front of their partners, it might be more appropriate to provide individual counseling instead of couple counseling, with gender specific psychological interventions.

This study included analysis of a large cohort of Chinese men undergoing diagnostic investigation for infertility and ART treatments. This is the first large scale clinic study which demonstrated the presence of anxiety among Chinese men undergoing diagnostic investigation. And for the first time, we provided the detailed comparison between men undergoing diagnostic investigation and ART treatments in China.

Nonetheless, the limitations of the present study should also be considered. The questionnaire was completed by men during the waiting time before the semen sample collection. This was the most nervous or anxious time, so this might partially explain why the prevalence of anxiety maybe higher than other studies.

In conclusion, we found that men undergoing diagnostic investigation may experience distress. This may currently be overlooked by healthcare professionals. A greater understanding of the risk factors that contribute to anxiety among males during diagnostic investigation could help healthcare professionals to identify those patients in greater need of psychological support and plan an adequate therapeutic strategy.

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