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## Anxiety and depression symptoms in infertile men during their first infertility evaluation visit

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### ABSTRACT

**Objective:** To assess the psychological condition of men at the start of the infertility work-up.

**Methods:** Men seeking an infertility evaluation for the first time were recruited. Depression and anxiety symptoms and subjective psychological burden were assessed with the Beck Depression Inventory (BDI), the Spielberger State-Trait Anxiety Inventory (STAI), and a visual analog scale (VAS).

**Results:** Data from 113 patients were analyzed. The mean age of the patients was 33.3 (range: 23–54) years, whereas the mean duration of infertility was 16.3 (range: 0–96) months. Results from the BDI and STAI were 2.24 (SD:  $\pm 3.18$ ) and 33.74 (SD:  $\pm 8.04$ ). Mild depressive symptoms were found in 4.5% of patients, whereas anxiety reached an abnormal level in 4.9%. There were significant correlations between the results from the BDI score and the duration of infertility ( $p = .024$ ), whereas the STAI and VAS scores showed no similar connection ( $p = .142$  and  $p = .261$ , respectively). Among patients with infertility longer than 2 years, mild depressive symptoms occurred in 23.1%.

**Conclusion:** Among men, the levels of depressive and anxiety symptoms were low at the start of the infertility work-up. Depressive symptom levels increased significantly with the duration of infertility, whereas anxiety levels and VAS scores did not demonstrate a similar correlation.

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Depression; anxiety; infertility; men

## Introduction

Infertility is defined as the inability of a couple to achieve pregnancy within 1 year despite regular unprotected intercourse [1]. In developed countries, the lifetime prevalence of infertility is estimated to be approximately 16% [1]. The experience of undesired childlessness places a heavy burden on both partners; a noteworthy proportion of couples classify infertility as the most stressful problem in their lives [2,3]. It has been demonstrated that infertility increases the levels of anxiety and depression and decreases the general quality of life [4]. The reported data indicate that difficulties with fulfilling the desire of having a child and receiving the diagnosis of infertility have a more pronounced impact on the mental health of women than on that of men [4–6]. While the psychological aspects of childlessness among men have been less investigated in the past compared to women [5–7], studies

on men have gained increasing importance in recent years [8].

It must be stressed that all previously published studies in the field have been conducted at infertility centers after examinations or during the course of therapeutic interventions, a condition which may appear as a confounding factor. To date, there are no studies on the levels of anxiety and depression in the population of infertile men prior to involvement in any diagnostic and therapeutic fertility procedures. At the same time, the initial level of depressive and anxiety symptoms may play an essential role in the subsequent psychological condition of male patients during courses of infertility treatment [7,9–11]. Our purpose was to measure general anxiety and depression levels in men presenting for infertility evaluation for the first time before starting the infertility work-up. The possible connections between depressive and anxiety

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symptoms, the duration of infertility, and sperm characteristics were also investigated.

## Methods

Heterosexual men seeking a fertility evaluation were recruited at our Andrology Unit between September 1, 2013 and March 1, 2014. Only first-time patients were enrolled provided they had not previously participated in any andrological testing or in any other examination related to infertility. In Hungary, since patients have immediate access to fertility specialists (both gynecologists and male fertility specialists), general practitioners are not routinely involved in fertility evaluation and treatment. The female partners of the participants participated in ongoing parallel infertility investigations, but in accordance with our clinical routine, neither tubal patency testing nor any type of assisted reproductive technique was performed prior to a sperm analysis on the spouse or partner. In general, the patients initiated the investigations themselves or according to the advice of the partner's gynecologist. Thus, at the time of enrollment, the fertility status of the couple was unknown. A previously diagnosed psychological disorder was an exclusion criterion. Informed consent was obtained from all the participants. After the performance of physical examination, but before semen was produced for sperm analysis, sociodemographic and medical data and information on lifestyle factors and fertility history were collected via self-reported questionnaires. A visual analog scale (VAS) relating to the psychological distress tied to the present examination, a valid Hungarian version of the Beck Depression Inventory (BDI) [12,13] and the Spielberger State-Trait Anxiety Inventory (STAI) [14,15] were completed by the patients. Briefly, the BDI, which contains 21 questions with four possible answers, is one of the most frequently used screening tools to assess the severity of depressive symptoms [12]. The BDI results were rated as follows: 0–9: no depressive symptoms; 10–18: mild depressive symptoms; 19–29: moderate depressive symptoms; and >30: severe depressive symptoms. The STAI is an introspective psychological inventory consisting of 20 self-report items. This scale reflects current anxiety symptoms: higher scores are indicative of higher levels of anxiety [14]. A mean STAI score of 38.4 (SD:  $\pm 10.66$ ) was reported earlier for the male Hungarian population; a score of >49 is regarded as a clinically significant level of anxiety [15]. The VAS assessed the psychological distress of the present evaluation on a numerical scale from 0 to 10, where 0

meant no distress and 10 meant unbearable distress. The correlations between the duration of childlessness and the VAS, BDI and STAI results were analyzed.

The main sperm characteristics (sperm concentration, total motility, progressive motility, and sperm morphology) were also analyzed.

Statistical analyses were performed with SPSS 17.0 for Windows (SPSS Inc., Chicago, IL, USA). The Shapiro–Wilk test and analyses of the Q-Q plot diagrams demonstrated that age, body mass index (BMI), VAS scores, BDI scores, sperm characteristics, and the duration of infertility were not normally distributed while the distribution of the STAI results was normal. The correlations between the duration of infertility and the VAS, BDI, and STAI results were determined using regression analyses. In addition, the correlation between the BDI and STAI scores and sperm characteristics were also analyzed (not presented in the tables). A multivariable linear regression analysis was also controlled for age, BMI, smoking, and the number of children. Correlation coefficients ( $B$ ) were calculated for both the univariate and multiple linear regression, whereas standardized coefficients ( $\beta$ ) were given for univariate analyses and semipartial correlations ( $r$ ) for multivariable regression. To express the results in terms of the proportion of explained variance, the square of the standardized coefficient and the square of the semipartial correlation were calculated. All variables which did not follow the Gaussian distribution were transformed logarithmically ( $\log_{10}(x+1)$ ) so that they could be included in the regression model. The distributions of BDI and STAI score categories were compared with the duration of infertility categories using the chi-square trend test. The distributions of the VAS scores among the three subgroups of the duration of infertility were assessed with the analysis of variance (ANOVA) test. Statistical significance was defined at the two-sided  $p = .05$  level.

All procedures followed were in accordance with the ethical standards of the Helsinki Declaration of 1975, as revised in 2000. The study protocol was approved by the Regional and Institutional Human Medical Biological Research Ethics Committee.

## Results

A total of 117 patients were invited to take part in the study, but four (3.4%) patients declined to complete the questionnaire; hence, it was the results from 113 patients that were analyzed. All of them were Caucasian. Their mean age was 33.3 (range: 23–54) years, whereas the mean duration of attempting to

achieve pregnancy was 16.3 (range: 0–96) months. The mean age of their partners was 31.7 (range: 20–47) years, and the duration of the patients' relationship was 5.9 (range: 0.25–27) years on average. With regard to marital status, 42.5% were married and 57.5% lived in partnerships. Only 10 men (8.8%) had a child from the present relationship and five (4.4%) from a previous relationship. Furthermore, 12 patients (10.6%) had a partner who had a spontaneous abortion in the present relationship. The average frequency of sexual intercourse was 2.7 (range: 0.5–8) times a week, with only two patients (1.7%) reporting mild erectile dysfunction. With regard to the questionnaires, the BDI was completed entirely in 110 cases (97.3%), whereas both the STAI and VAS were completed in 102 cases (90.3%). The mean results for the BDI and STAI were 2.24 (standard deviation (SD):  $\pm 3.18$ ) and 33.74 (SD:  $\pm 8.04$ ), respectively. No patient was registered with high BDI scores ( $\geq 19$  points), indicating moderate or severe depressive symptoms. The VAS finding relating to the self-reported psychological distress of the present examination was 2.52 on average (SD:  $\pm 2.04$ ; range: 1–8). In univariate and multivariable analyses, significant correlations emerged with low regression coefficients between the BDI scores and the duration of infertility ( $p = .042$ ,  $B = 0.207$ ,  $\beta^2 = 0.038$  and  $p = .024$ ,  $B = 0.241$ ,  $r^2 = 0.047$ , respectively), whereas the STAI score showed no correlation ( $p = .120$ ,  $B = 0.005$ ,  $\beta^2 = 0.024$  and  $p = .142$ ,  $B = 0.005$ ,  $r^2 = 0.022$ ; respectively). The result for the VAS tended to be higher with the duration of childlessness ( $p = .044$ ,  $B = 0.23$ ,  $\beta^2 = 0.023$ ), but the correlation became non-significant when we controlled for other factors in the multivariable analysis ( $p = .261$ ,  $B = 0.178$ ,  $\beta^2 = 0.013$ ) (Table 1).

There were significant correlations between the STAI and VAS scores (univariate analysis:  $p < .001$ ;  $B = 19.270$ ,  $\beta^2 = 0.174$  and multivariable analysis:  $p < .001$ ;  $B = 20.228$ ,  $r^2 = 0.181$ ) and between STAI and BDI scores (univariate analysis:  $p < .001$ ,  $B = 11.192$ ,

$\beta^2 = 0.153$  and multivariable analysis:  $p < .001$ ;  $B = 11.532$ ,  $r^2 = 0.130$ ) (not shown in the tables). The frequency of mild symptoms of depression (BDI score: 10–18) increased significantly as the duration of infertility grew longer (groups of 0–12 months, 13–24 months and  $> 24$  months) ( $p = .006$ ) while the incidence of an abnormal level of anxiety (STAI score  $> 49$ ) ( $p = .353$ ) and self-reported psychological distress tied to the examination (VAS scores) ( $p = .086$ ) did not differ in these three groups (Table 2). No sperm variable showed a correlation with the BDI, STAI, or VAS scores (not shown in the tables).

## Discussion

In women and men, the desire to have a child is determined by several factors, including personal, cultural, and religious characteristics, and it is influenced by the degree of reproductive autonomy and access to contraception [7]. Similar proportions of women and men intended to have a child in a population-based study in England [16], and comparable results were reported from Germany in men aged 31–40 years [17]. Because of its fundamental nature, the failure to fulfill this desire can have potential psychological consequences. The experience of infertility appears to be linked to an increased level of psychological distress not only in women but also in men [6,18].

It has been confirmed that just like women, men often experience damage to self-esteem [19] and feel inadequacy in relation to their social and familial role in the case of infertility [20], but the commonly used coping strategies are different among men and women [21]. Men tend to cope by increasing their involvement in work and other activities; they are more problem-solving oriented and tend to suppress their emotions in an effort to support their wives [22,23]. These mechanisms are likely to result in the underreporting of the levels of infertility-related distress among men [24].

The present study aimed to determine the level of depressive and anxiety symptoms among men and to examine the possible correlations with the duration of infertility before any investigations or interventions. In our study population, the BDI scores revealed only a mild depressive symptomatology in 4.5%, a rate which is very similar to 4.3%–5.1% of severe symptoms reported among men undergoing infertility treatment [25,26]. Thus, the question arises whether infertility-related procedures enhance the mild depressive symptoms present at the start of the evaluation. This may be suggested by the fact that female patients are not

**Table 1.** Correlations between the BDI, VAS, and STAI scores and the duration of infertility among men seeking an infertility evaluation for the first time (total = 113).

	Univariate linear regression			Multivariable linear regression		
	<i>p</i> value	<i>B</i>	$\beta^2$	<i>p</i> value	<i>B</i>	$r^2$
BDI score	0.042	0.207	0.038	0.024	0.241	0.047
STAI score	0.120	0.005	0.024	0.142	0.005	0.022
VAS score	0.044	0.23	0.023	0.261	0.178	0.013

VAS on self-reported psychological distress during the present andrological examination; only tests that were completed entirely were included in the analysis.

*B*: regression coefficient; *r*: semi-partial correlation;  $\beta$ : standardized coefficient.

**Table 2.** Incidence of patients with depressive symptoms, clinically relevant level of anxiety, and average VAS results according to childlessness duration subgroups (0–12; 13–24; >24 months).

Duration of childlessness (months)	BDI score (n = 110)		STAI score (n = 102)		VAS score (n = 102)
	Patients without depressive symptoms (BDI < 10)	Patients with depressive symptoms (BDI: ≥ 10)*	Number of patients without anxiety (STAI < 50)	Number of patients with clinically relevant level of anxiety (STAI ≥ 50)**	Average result of VAS***
0–12	58	0 (0%)	52	2 (3.7%)	2.13
13–24	37	2 (5.1%)	34	2 (5.5%)	2.92
>24	10	3 (23.1%)	11	1 (8.3%)	3.10
Total	105	5 (4.5%)	97	5 (4.9%)	2.52
p value		.006		.353	.740

VAS on self-reported psychological distress during the andrological examination.

The distributions of the BDI and STAI score categories were compared with the duration of childlessness categories using the chi-square trend test. The comparisons of the distributions of the VAS scores in the duration of childlessness categories were assessed with the ANOVA test.

more depressed than controls before the start of infertility treatment [27], but couples who have taken part in repeated assisted reproductive interventions display significantly higher levels of depression both in the cognitive and affective dimensions [28]. Several effective methods have been introduced to screen couples for emotional distress [18,29–31]. Studies focusing on such methods report fundamental gender differences in dealing with fertility problems and underline the need for psychological support during infertility treatment [18,31,32]. In a recent study, a previous major depressive disorder predicted the appearance of depressive symptoms during treatment [33]. Their results led Holley et al. [33] to recommend a routine pretreatment assessment for a history of depressive disorders both in men and women. Our results indicate that there is a low, but significant correlation between the duration of infertility and depression scores. 23.1% of the patients with a history of childlessness with a duration of more than 24 months suffered from a mild level of depressive symptomatology.

Somewhat surprisingly, generally only low levels of anxiety were measured in the study population, and there was no correlation between the degree of anxiety symptoms and the duration of infertility. Furthermore, the frequency of a clinically significant level of anxiety did not depend on the duration of childlessness. In previous studies, 4.9%–8.8% of men undergoing infertility treatment have been reported to demonstrate anxiety symptoms [6,34], which can negatively affect the quality of the semen [35]. However, the available data are inconsistent for the anxiety level of patients before starting the first *in vitro* fertilization (IVF) cycle [36]. In line with other studies, our results suggest that anxiety symptoms in men may develop primarily during their fertility treatment (and after its potential failure). Couples taking part in assisted reproductive programs experience long-term raised anxiety, which is supported by other investigations too: Zorn et al. [37], for example, found

that anxiety in men was related to previous IVF attempts, and 3.0% of men developed anxiety symptoms during an IVF/intracytoplasmic sperm injection (ICSI) cycle [5].

In a previous investigation, men demonstrated psychological difficulties in connection with semen analysis, and feelings of shame and degradation were commonly reported [38]. In our study, reasonably low VAS scores were reported, and despite the tendency to be higher with the longer period of infertility, the relationship became non-significant when confounders were taken into account. At the same time, we observed a moderate correlation between VAS and STAI scores, as patients with higher STAI results presented elevated distress levels during the andrological examination. This interdependence is obvious as state-trait anxiety was measured with the STAI and patients estimated their current distress level during the VAS. We think that such correlation confirms the findings from our investigation. Furthermore, we found a significant, but weak correlation between the STAI and BDI scores. This is in line with previous results, since a similar, although stronger association was found in a study of 859 men in infertile couples in reference to their first IVF process [5].

A previous study suggests that higher levels of psychological stress, and depressive and anxiety symptoms impair sperm count, sperm motility, and sperm morphology [35]. In our investigation, we found no similar correlations between psychological distress, depressive symptoms, and sperm parameters. Therefore, it is entirely possible that only severe distress and depression affect the fertility status of the male, conditions which were not found in our study population.

### Limitations

It bears noting that our study has some limitations. In developed countries, only 56.1% of infertile couples



seek medical help on average [1]. It is difficult to analyze the psychological condition of hidden patients, thus possibly causing a significant selection bias. It is entirely possible that patients with relatively mild depressive signs and anxiety level seek medical help despite the fact that access to an infertility specialist is quite easy in Hungary. Such easy access is supported by an additional observation in our study that while infertility guidelines basically recommend starting an investigation after 1 year of unprotected sexual life without pregnancy, a noteworthy group of patients (32 out of 113, 28.3%) in our study initiated a fertility investigation earlier than 12 months and a small proportion (2 out of 113, 1.8%) approached the Andrology Unit even before attempting to achieve pregnancy. Importantly, only low or mild levels of anxiety and depression scores were observed in our study population. However, this finding can be explained with several facts. Depressive and anxiety symptoms were measured at the start of the infertility work-up, before confronting couples with the result. The men presenting for infertility evaluation are usually healthy men, who might also believe that they have no fertility problems. Furthermore, most of them are in their thirties; thus, they are not representative of the general population. The experience of infertility-related depressive or anxiety symptoms might be stronger later in life when individuals are nearing the end of their reproductive lifespan [3]. In our investigation, face-to-face interviews were not conducted; only questionnaires were used, thus limiting the depth of the psychological exploration. Moreover, the partner's infertility-specific distress was not assessed, thus possibly influencing the men's psychological condition [25]. It is well known that basal temperature measurements, ovulation tests, and hence timed intercourse are often initiated by the female partner before expert medical help is sought, and this might also increase the psychological distress among men [39]. Furthermore, certain conditions that influence fertility status negatively (e.g. menstrual cycle disorders, testicular diseases, previous operations affecting the ovaries or testes, etc.) may make the patients aware of their infertility. This factor may potentially affect psychological status and cannot be ruled out completely. Although only a relatively low number of men were recruited in the present study, as many as 96.6% of the invited patients agreed to participate. This participation rate is a considerably high result compared to previous studies where high non-response rates were demonstrated among men in the context of infertility problems [40]. It is likely that this less time-consuming

method of psychological evaluation is more convenient for the patients, and it could be suitable for first-line screening of depressive and anxiety symptoms.

## Conclusion

Unexpectedly, low levels of depressive and anxiety symptoms were found in men at the start of infertility evaluation. A weak, but significant correlation was demonstrated between the duration of infertility and the level of depressive symptoms. In contrast, the duration of infertility did not affect the development of anxiety, which seems to be related to the infertility treatment itself. No correlation was found between sperm characteristics and the levels of depressive or anxiety symptoms.

## Disclosure statement

The authors declare that they have no competing interests.

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#### ► Current knowledge on this subject

- Infertility is one of the most stressful problems in the life of a couple. It has been demonstrated that infertility increases the levels of anxiety and depression symptoms both in men and women. While the reported data indicate that childlessness has a more pronounced impact on the mental health of women than on that of men, studies on men have gained increasing importance in recent years.

#### ► What this study adds

- This study appears to be the first one to evaluate the general anxiety and depression levels of the male partner before any fertility investigation. In this population, only low levels of depressive and anxiety symptoms were demonstrated. Depression symptomatology showed a weak, but significant correlation with the duration of infertility as early as the time of the first visit. The duration of childlessness did not affect the level of anxiety, which seems to develop later, during the infertility treatment.