



The Relationship of Male Infertility with Somatosensory Amplification, Health Anxiety and Depression Levels

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Objective The purpose of this study was to investigate the relationship between infertility and factors such as anxiety, health anxiety, depression, and somatosensory amplification in male patients presenting with infertility.

Methods In this study, we evaluated 198 patients (infertile group: 130, control group: 68). Patients that fit the inclusion criteria were informed about the aim and method of the study and filled out sociodemographic data collection form, Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), The Somatosensory Amplification Scale (SSAS), and Health Anxiety Inventory (HAI) questionnaires.

Results The mean scores for SSAS, HAI, BAI, and BDI were significantly higher in the infertility group compared to the control group ($p < 0.001$ for all comparisons). Moreover, the mean scores of the patients in the primary infertile group ($n = 107$) were significantly higher than in the secondary infertile group ($n = 23$) ($p < 0.05$ for all comparisons). Logistic regression analysis revealed that infertility had a significant effect on age, HAI and BDI.

Conclusion Psychiatric evaluation of infertile patients may contribute to more efficient use of health services, may reduce the negative effects of anxiety and depression on fertility, and in turn, increase the success of infertility treatment. Therefore, we recommend that each patient presenting with infertility undergoes psychiatric evaluation as part of their treatment. **Psychiatry Investig 2020;17(4):350-355**

Key Words Somatosensory amplification, Health anxiety, Depression, Male infertility, Primary infertility.

INTRODUCTION

According to the World Health Organization (WHO) infertility is determined as the absence of spontaneous pregnancy in a couple despite unprotected sexual intercourse for one year.¹ In a WHO study examining 8,500 infertile couples, 37% had a female infertility factor, 8% had a male factor, 35% had both male and female factors, and in 20% of couples the factor could not be determined. Infertility is detected in 10–15% of couples desiring pregnancy and 90% of these couples present with primary infertility, while 10% present with secondary infertility. Primary infertility is determined as the absence of spontaneous pregnancy for 12 months despite unprotected regular sexual intercourse. Meanwhile, the secondary infertility

is defined as the failure become pregnant following the birth of one or more biological children. Although there is no clear guidelines for secondary infertility period, many studies suggest the period of 12 months for secondary infertility.² Diagnosis of infertility and treatment planning may cause psychological stress, anxiety and depression in one or both.³ Anxiety and depressive disorders were reported to be more common in infertile individuals.^{2,4-9} It has been reported that the incidence of psychiatric disorders in both male and female infertility is 12.41% after 2 years of diagnosis and that psychiatric support might be needed during the diagnosis and the treatment of infertility.⁸ In addition, a change in the blood and semen levels of hormonal and oxidative stress products has been shown to depend on the level of depression and anxiety.^{5,10} Studies with patients receiving infertility treatment emphasize that treatment success decreased with increasing levels of anxiety and depression.^{11,12}

Some studies have reported a relationship between depression, anxiety and somatosensory amplification, which is when a person experiences somatic sensations as more intense, harmful and disconcerting.^{13,14} In infertile patients, anxiety and depression related somatosensory amplification may lead to

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more frequent hospital visits and more detailed and unnecessary examinations. We believe that in such situations, patients may benefit from psychiatric evaluations to determine the relationship between symptoms and psychiatric conditions. As a result, unnecessary examinations and recurrent hospital visits could be reduced.

As far as we know, there were no studies in the literature that evaluated the level of somatosensory amplification and health anxiety in infertile patients. The purpose of this study was to investigate the relationship between infertility and factors such as anxiety, health anxiety, depression, and somatosensory amplification in male patients presenting with infertility.

METHODS

This is a cross-sectional case-control study evaluating patients admitted to the urology outpatient clinic due to infertility between February 2019 and May 2019. This study was planned by the principles of the Declaration of Helsinki after the local ethics committee approval (2017-KAEK-189_2019.02.28_02). The individuals who accept to participate were informed about the study and written informed consents were obtained from all participants. Patients between 18–45 years of age, with cognitive ability to complete the tests, without any history of psychiatric disease, hormonal pathology (hypo/hypergonadism, hypo/hyperthyroidism, hyperprolactinemia, etc.), and who were unable to achieve pregnancy for at least one year were included in the study. Patients who were using psychiatric drugs, who had neurological diseases, alcohol addiction, had children within the last year, and had renal, hepatic, cardiovascular and/or metabolic diseases were excluded from the study. A total of 130 patients who met the study criteria were included in the study. The control group consisted of 68 volunteers who did not have any physical or psychiatric diseases and had children within the last year. Sociodemographic data of all participants including age, duration of education, and number of cigarettes smoked per day were recorded. The duration infertility was also recorded for patients in the infertile group.

Assessment tools

Data collection form

Upon careful examination of the literature, researchers prepared a questionnaire to obtain relevant information about the independent variables of the study such as the sociodemographic and clinical characteristics from the patients and healthy volunteers.

Beck Depression Inventory (BDI)

Beck et al.¹⁵ developed this scale to evaluate depression-as-

sociated physical, emotional, cognitive, and motivational symptoms. This is a self-reported scale that consists of 21 questions that have four available answers. Each answer is scored between 0–3 points (based on the intensity of the answer) and the total score varies from 0 to 63 points. While the total score of 0–9 points indicate minimal depressive symptoms, scores ranging 30–63 indicate severe depression. Hishi¹⁶ performed the BDI's reliability and validity study for Turkish population.

Beck Anxiety Inventory (BAI)

The BAI scale assesses the extent of anxiety symptoms.¹⁷ Similar to BDI, BAI is also self-administered inventory consisting of 21 questions that are scored between 0 and 3 points. The total score varies from 0 to 63 points. The higher the total score, the higher is the severity of the individual's anxiety. The reliability and validity of this inventory for Turkish population was tested by Ulusoy et al.¹⁸

The Somatosensory Amplification Scale (SSAS)

Barsky et al.¹⁹ developed the Somatosensory Amplification Scale to measure the sensitivity to disturbing bodily sensations. The scale consists of 10 questions and each question is scored within the range of 1 to 5. The total score is accepted as a symptom amplification score. Gulec and Sayar²⁰ performed the reliability and validity study for Turkish population was conducted.

Health Anxiety Inventory (HAI) (short version)

Health Anxiety Inventory is a self-administered scale that consists of 18 items.²¹ The first 14 items of the scale question the mental state of the patients, while the remaining 4 items ask patients to contemplate about their possible mental state if they had a critical illness. Each item is scored between 0–3 and a high score indicates a high level of health anxiety. Turkish reliability and validity study was performed by Aydemir et al.²²

Application

Patients that fit the inclusion criteria were informed about the aim and method of the study and filled out sociodemographic data collection form, BDI, BAI, SSAS, and HAI questionnaires.

Statistical analysis

All analyses were performed by SPSS version 25.0 (Statistical Package for Social Sciences; IBM Corp., Armonk, NY, USA). Kolmogorov-Smirnov tests were applied to determine the normal distribution of the data. Mann-Whitney U test was used to compare non-parametric variables. Spearman's correlation test was used for groups' correlation analyses. A regression

model was designated for variables with significant correlation, and diagnostic tests of this model were performed. p values <0.05 were accepted as significant. Results of the previous studies were evaluated and power analysis was performed. The alpha and beta errors were emphasised, respectively, as 0.05, and 0.20. The minimum number of patients required to obtain 80% power was calculated as 54 in each group.

RESULTS

The mean age of the infertility and control groups was 29.95 ± 4.73 (21–44) and 28.65 ± 5.07 (21–40) years, respectively. There was no significant difference between the groups in terms of age, education level, smoking rate, and the amount of cigarettes smoked per day. In the infertility group, the mean duration of infertility was 32.08 ± 37.5 (12–240) months (Table 1).

The mean SSAS score between the infertility and control groups was 25.42 ± 7.59 and 21.01 ± 8.16 , the mean HAI score was 18.04 ± 6.61 and 11.91 ± 6.31 , the mean BAI score was 13.88 ± 7.71 and 9.16 ± 8.75 , and the mean BDI score was 12.86 ± 7.25 , and 7.83 ± 6.98 , respectively. The mean SSAS, HAI, BAI, BDI scores were significantly higher in the infertility group compared to the control group ($p < 0.001$ for all comparisons) (Table 1). When a post-hoc power analysis was performed with alpha 0.05, and effect size 1.1883, the power of the study was found to be 0.9999.

The correlation analysis in infertility group revealed that there was no significant correlation between the duration of education and SSAS, HAI, BAI, and BDI scores ($p > 0.05$). However, SSAS was positively correlated with HAI and BAI ($r = 0.443$; $p < 0.001$, $r = 0.333$; $p < 0.001$, respectively). Moreover, HAI was a positive correlated with BAI and BDI ($r = 0.313$; $p < 0.001$, $r = 0.183$; $p = 0.037$, respectively). There was a positive correlation between BAI and BDI as well ($r = 0.405$; $p < 0.001$) (Table 2).

When primary ($n = 107$) and secondary ($n = 23$) infertile patients were evaluated separately, the mean scores of patients in the primary infertile subgroup were statistically higher than the secondary infertile subgroup ($p < 0.001$ for SSAS and BAI, $p = 0.018$ for HAI, $p = 0.01$ for BDI) (Table 3).

Logistic regression analysis used to evaluate factors affecting the presence of infertility indicated that age (odds ratio: 1.086, $p = 0.036$), health anxiety (odds ratio: 1.154, $p < 0.001$), and BDI (odds ratio: 1.078, $p = 0.022$) were significant factors. Although smoking increased infertility by approximately 4 times (odds ratio: 3.892), there was no statistical significance ($p = 0.062$) (Table 4).

DISCUSSION

In this study, psychiatric scale scores of men presenting with infertility were higher compared to healthy controls. The scale scores were higher in patients with primary infertility compared to patients with secondary infertility. In the study population, all psychiatric scale scores correlated positively with each other, and there was a significant relationship between infertility and age, HAI and BDI.

Infertility affects about 15% of worldwide population and causes substantial financial loss along with psychological stress, anxiety and depression in one or both partners.²³ There are many studies evaluating psychological well-being of patients with infertility, especially their anxiety and depression levels.^{2,4-12,24} Increased stress-related anxiety and depression have been shown to reduce the success of in vitro fertilization by affecting cytokine levels.¹¹ In addition, it has been emphasized that semen parameters were adversely affected as a result of changes in the blood hormonal levels.¹⁰ These data indicate that increased anxiety during the diagnosis and treatment of infertility may adversely affect the success of treatment.

Table 1. Comparison of sociodemographic data and scale scores of infertility and control groups

	Male infertility (N=130) Mean \pm SD (min-max)	Control (N=68) Mean \pm SD (min-max)	Z	p value [†]
Age	29.95 \pm 4.73 (21–44)	28.65 \pm 5.07 (21–40)	-2.926	0.116
Duration of education (years)	10.91 \pm 3.56 (5–17)	11.79 \pm 2.95 (5–15)	-1.625	0.104
Cigarettes smoked per day (N)	7.5 \pm 8.7 (0–30)	8.15 \pm 10.6 (0–40)	-0.278	0.907
SSAS	25.42 \pm 7.59 (10–46)	21.01 \pm 8.16 (10–41)	-3.791	<0.001*
HAI	18.04 \pm 6.61 (3–39)	11.91 \pm 6.31 (3–25)	-5.797	<0.001*
BAI	13.88 \pm 7.71 (0–40)	9.16 \pm 8.75 (0–29)	-4.224	<0.001*
BDI	12.86 \pm 7.25 (1–38)	7.83 \pm 6.98 (0–23)	-4.690	<0.001*
Duration of infertility (months) mean \pm SD (min-max)		32.08 \pm 37.5 (12–240)		
Smoking rate (%) (N)	50.8 (66)	55.9 (38)	$\chi^2 = 0.468$	$p = 0.494$

* $p < 0.001$, [†]Mann-Whitney U Test. SD: standard deviation, SSAS: Somatosensory Amplification Scale, HAI: Health Anxiety Inventory, BAI: Beck Anxiety Inventory, BDI: Beck Depression Inventory

Table 2. Correlation studies in infertility and control groups

	SSAS		HAI		BAI		BDI	
	r	p	r	p	r	p	r	p
All participants (N=198)								
Education [‡]	-0.037	0.609	-0.080	0.264	0.085	0.236	-0.061	0.393
SSAS [‡]			0.401	<0.001 [†]	0.371	<0.001 [†]	0.248	<0.001 [†]
HAI [‡]					0.425	0.001 [†]	0.322	<0.001 [†]
BAI [‡]							0.593	<0.001 [†]
Infertility (N=130)								
Education [‡]	-0.059	0.504	0.006	0.949	0.069	0.433	0.014	0.875
SSAS [‡]			0.443	<0.001 [†]	0.333	<0.001 [†]	0.147	0.096
HAI [‡]					0.313	<0.001 [†]	0.183	0.037*
BAI [‡]							0.405	<0.001 [†]

*p<0.05, †p<0.001, ‡Spearman's correlation test. SSAS: Somatosensory Amplification Scale, HAI: Health Anxiety Inventory, BAI: Beck Anxiety Inventory, BDI: Beck Depression Inventory

Table 3. Comparison of scale scores of primary and secondary infertility patients

	Primary infertility (N=107) mean±SD (min-max)	Secondary infertility (N=23) mean±SD (min-max)	Z	p value [‡]
SSAS	26.70±7.41 (10-46)	19.47±5.33 (10-30)	-4.182	<0.001 [†]
HAI	18.69±6.69 (3-39)	15.04±5.38 (7-25)	-2.359	0.018*
BAI	14.90±7.30 (1-40)	9.13±7.94 (0-33)	-3.638	<0.001 [†]
BDI	13.61±7.41 (1-38)	9.39±5.37 (1-20)	-2.582	0.01*

*p<0.05, †p<0.001, ‡Mann-Whitney U test. SSAS: Somatosensory Amplification Scale, HAI: Health Anxiety Inventory, BAI: Beck Anxiety Inventory, BDI: Beck Depression Inventory

Table 4. Evaluation of the effect of age, SSAS, health anxiety, smoking, anxiety and depression levels on infertility by logistic regression analysis

	B	Wald	Exp (B)	95% CI		p value
				Lower	Upper	
Age	0.083	4.391	1.086	1.005	1.174	0.036*
SSAS	0.046	3.168	1.047	0.995	1.100	0.075
HAI	0.143	18.200	1.154	1.080	1.232	<0.001 [†]
BAI	-0.008	0.074	0.992	0.939	1.049	0.786
BDI	0.075	5.261	1.078	1.011	1.150	0.022*
Smoking	1.359	5.635	3.892	0.934	16.213	0.062

*p<0.05, †p<0.001. SSAS: Somatosensory Amplification Scale, HAI: Health Anxiety Inventory, BAI: Beck Anxiety Inventory, BDI: Beck Depression Inventory

Anxiety may cause a more severe perception of the present danger. At the same time, as the level of anxiety increases, somatic complaints become more frequent. Anxiety and depression levels may increase in diseases with uncertain organic etiology and long duration of treatment, such as infertility.²⁵ In a study by Chen et al.,²⁶ 112 female infertile patients who applied to an assisted reproduction clinic were evaluated and it was determined that generalized anxiety was 23.2% and major depressive disorder was 17.0%. They emphasized that depressive and anxiety disorders were highly prevalent among infertile women. In parallel with aforementioned studies, in

our study, infertility had a significant effect on depression (odds ratio: 1.078).

As far as we know, there are no studies that evaluated HAI and SSAS scores in male patients with infertility. In our study, HAI scores of infertile patients were higher than the control group. Health anxiety is defined as the situation in which the individuals believe that they have serious illness due to their perceptions, although, there is no somatic disease.²⁷ In addition, the increase in health anxiety was correlated with the increase in anxiety and depression. The regression analysis revealed that infertility had a significant effect on HAI (odds

ratio: 1.154). Moreover, HAI scores of the patients with primary infertility were higher than those with the secondary infertility. These results indicate that infertile patients were more anxious about their health.

Somatosensory amplification is an unusually intense and disturbing sensation of somatic and visceral sensations. SSA has three components: attention to the increase in bodily sensations, focusing on several weak and rare bodily sensations, cognitive and emotional reactions to bodily sensations.¹⁴ As a result of the anxiety and stress of life, the patients may assume the role of an ill person even though they are healthy, with the fear of being ill. This new role may develop physical and emotional changes in individuals.²⁸

It has been reported that there is a positive relationship between depression, anxiety, and somatosensory amplification.¹³ Somatosensory amplification was first defined in hypochondriacal patients. These patients report high levels of subjective bodily sensations as a result of their different beliefs and assumptions. However, the results of the studies indicate that these symptoms were not specific to hypochondriacal patients.²⁹ Moreover, a positive correlation has been shown between the severity of anxiety symptoms and SSAS in patients with generalized anxiety disorder.³⁰ In our study, it was established that infertile patients had increased anxiety-related somatosensory amplification. Infertility is a condition that requires repeated tests during diagnosis and treatment. Patients may be exposed to prolonged treatment interventions and repeated medical examinations, which may occasionally fail. This process may increase anxiety, somatosensory amplification, and cause health-related concerns. Köteles et al.¹³ hypothesized that SSA was not an exaggeration of sensations solely, it was, also, an increased threat sensitivity to any perceived threat to body integrity. In other words, they are extremely sensitive to any external danger. It is a kind of organism's defense for survival. Although, this sensitivity is adaptive in the early stages of life, it loses this feature by the time. In addition, somatic symptoms are a behavioral model which can be used in taking support and strength from the social environment of the person and within the family.³¹ From this perspective, it can be thought that infertile men acted such behaviors in order to reduce their sense of inadequacy to gain strength and support from their family and society.

In a study comparing the depression status of primary and secondary infertile men, it was reported that depression was more common in secondary infertile patients, which was suggested to be due to anxiety related to losing the ability to have children after having successful pregnancies.² In contrast to this study, in our study we found that SSAS, HAI, BAI, and BDI scores were higher in the primary infertile patients compared to the secondary infertile patients. In traditional societ-

ies, such as Turkey, great importance is given to reproduction and the continuity of the family, and couples are under pressure from their families and the community.³² This pressure may be greater on couples who have never had children. Accordingly, primary infertile patients in Turkey may have higher levels psychiatric disorders such as anxiety and depression.

Limitations of our studies are single center design and lower number of secondary infertile patients compared to that of primary infertile patients. The lack of a female infertile population is another limitation of this study, unfortunately the patient population admitted to our clinic was mostly male infertile. In addition, the cross-sectional evaluation of the study constitutes another limitation. However, the presence of a control group, careful selection of the cases, further dissection of the infertile group into primary and secondary infertility, and exclusion of the confounding factors constitute the strengths of our study.

In conclusion, infertile men are more likely to have depression, health anxiety and somatosensory amplification. Patients who have high level of health anxiety and increased somatosensory amplification usually visit hospitals more frequently. Unnecessary detailed examinations into the etiology and differential diagnoses of these patients will result in both the economic and labor loss. Moreover, this process will further increase already high levels of anxiety and depression in these patients. Therefore, we believe that inclusion of psychiatric evaluation and treatment in the conventional infertility treatments will contribute to the more efficient and cost-effective use of health services by reducing unnecessary hospital visits and medical interventions. Moreover, it may also improve infertility treatment success by reducing the negative effects of anxiety and depression on fertility. Another finding of our study suggests that one should keep in mind that psychiatric symptoms may be more intense in patients presenting with primary infertility.

Long-term, prospective, randomized trials with larger sample sizes are needed to further investigate the coexistence of psychiatric symptoms with infertility in order to increase patient life quality and treatment success.

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None.

Conflicts of Interest _____

The authors have no potential conflicts of interest to disclose.

Author Contributions _____

Conceptualization: Ünal Öztekin, Yunus Hacimusalar. Data curation: Ünal Öztekin, Abdullah Gürel. Formal analysis: Ünal Öztekin, Ozgul Karaaslan. Funding acquisition: Ünal Öztekin. Investigation: Ünal Öztekin, Yunus Hacimusalar. Methodology: Ünal Öztekin, Yunus Hacimusalar. Project administration: Ünal Öztekin. Resources: Yunus Hacimusalar, Ozgul Karaaslan. Software: Abdullah Gürel, Ozgul Karaaslan. Supervision: Yunus Hacimusalar, Ünal Öztekin. Validation: Abdullah Gürel, Ozgul

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