



## PREGNANCY-RELATED ANXIETY LEVEL AND ASSOCIATED FACTORS IN EXPECTANT FATHERS: CASE-CONTROL STUDY IN TURKEY

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DOI: 10.38045/ohrm.2023.1.08

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**Keywords:** expectant fathers, pregnancy, anxiety, childbirth, state-trait anxiety inventory.

**Introduction.** Perinatal behavior and involvement of fathers during pregnancy are known to affect maternal health, fetal outcomes, and the emotions and behavior of the infant after birth. **Material and methods.** This present paper is a case-control study performed on 232 men with pregnant wives (expectant fathers) with no known chronic or psychiatric illnesses and 316 with non-pregnant wives. Two questionnaires STAI forms and a questionnaire developed by the researcher were applied to the participants. **Results.** The frequency of anxiety in the EF was 9.9% for the STAI-1 and 10.7% for STAI-2. The frequency of anxiety in the control groups was 5.3% for the STAI-1 form and 2.5% for the STAI-2 form. In our study, the mean STAI-1 score of the EFs was  $41.2 \pm 7.5$ , the mean STAI-1 score of the controls was  $38.0 \pm 7.3$ , and there was a statistically significant difference between each other ( $p < 0.001$ ). The mean STAI-2 score of the EFs was  $41.2 \pm 7.5$ , the mean STAI-2 score of the controls was  $38.2 \pm 6.8$ , and there was a statistically significant difference between the two groups ( $p < 0.001$ ). The mean STAI-2 score of the EF group was  $43.8 \pm 7.3$  in the first trimester,  $41.6 \pm 7.7$  in the second trimester, and  $39.6 \pm 7.0$  in the third trimester. It was determined that spouses in the 1st trimester had higher anxiety levels than those in the second and third trimesters, according to the STAI-2 form ( $p = 0.008$ ). EF who had a postnatal babysitter, good sleep quality, did not experience a bad event, and were compatible with wives had a significantly lower level of anxiety (respectively  $p = 0.008$ ,  $p = 0.019$ ,  $p < 0.001$ ,  $p = 0.01$ ). **Conclusions.** Particularly in first pregnancies and the first trimester of pregnancy, father candidates may experience anxiety disorders more frequently and intensely. EF may need psychological support during pregnancy.

**Cuvinte cheie:** viitorii tați, sarcină, anxietate, naștere, inventar de stări de anxietate.

**NIVELUL DE ANXIETATE ATESTAT ÎN PERIOADA SARCINII ȘI FACTORI ASOCIAȚI LA VIITORII TAȚI: STUDIU DE CAZ REALIZAT ÎN TURCIA**

**Introducere.** Comportamentul perinatal și implicarea taților în timpul gravidității afectează considerabil sănătatea mamei, starea fătului, emoțiile și comportamentul sugarului după naștere. **Material și metode.** Cercetarea noastră este un studiu de caz realizat pe un lot de 232 de bărbați cu soții însărcinate (eventuali tați), fără boli cronice sau psihiatrice cunoscute și pe un grup de control de 316 bărbați cu soții care nu sunt însărcinate. Participanții au completat Formular STAI și un chestionar elaborat de cercetător. **Rezultate.** Frecvența anxietății la EF este de 9,9% pentru forma STAI-1 și 10,7% pentru STAI-2. Frecvența anxietății la controale este de 5,3% pentru forma STAI-1 și de 2,5% pentru forma STAI-2. În studiul nostru, scorul mediu STAI-1 al EF a fost  $41,2 \pm 7,5$ , scorul mediu STAI-1 al controalelor a fost  $38,0 \pm 7,3$  și a existat o diferență semnificativă statistic între ele ( $p < 0,001$ ). Scorul mediu STAI-2 al EF a fost de  $41,2 \pm 7,5$ , scorul mediu STAI-2 al controalelor a fost  $38,2 \pm 6,8$  și a existat o diferență semnificativă statistic între ele ( $p < 0,001$ ). Scorul mediu STAI-2 al grupului EF a fost de  $43,8 \pm 7,3$  în primul trimestru,  $41,6 \pm 7,7$  în al doilea trimestru și  $39,6 \pm 7,0$  în al treilea trimestru. S-a stabilit că soții din trimestrul I au niveluri de anxietate mai mari decât cei din trimestrul II și al treilea, conform formularului STAI-2 ( $p = 0,008$ ). EF care au avut o babysitter postnatală, somn de bună calitate, nu au experimentat un eveniment rău și au fost compatibili cu soțiile au manifestat un nivel de anxietate semnificativ mai scăzut (respectiv,  $p = 0,008$ ,  $p = 0,019$ ,  $p < 0,001$ ,  $p = 0,01$ ). **Concluzii.** În special în perioada primei sarcini și în primul trimestru de sarcină, candidații la rolul de tată pot prezenta, mai frecvent și mai intens, tulburări de anxietate. EF pot avea nevoie de suport psihologic în timpul sarcinii.

## INTRODUCTION

Anxiety disorders are unreasonable fears and anxiety that may be accompanied by physical symptoms. Anxiety is a normal response to stress, sadness, or a threat, but if it becomes very intense when faced with a stimulus, it increases rather than decreases over time, and, most importantly, it impairs the person's functionality, thus, anxiety should be considered a pathological disorder (1).

The lifetime prevalence of anxiety disorders has been reported to vary between 13.6% and 28.8%. The 12-month prevalence of anxiety disorders was found to be 6.7% in the Turkish Mental Health Profile (2).

The loss of functionality or decreased quality of life caused by anxiety disorders is equivalent to that of chronic diseases. Although they are familiar and cause significant loss of functionality, the probability of being diagnosed is low, since most of these patients refer to other departments of general medicine rather than psychiatry and undiagnosed anxiety disorder cases lead to high health expenditures (1).

The role of the father during pregnancy is not considered crucial in society. In the prenatal period, however, fathers have a significant influence on the well-being of their children. Perinatal behavior and involvement of fathers during pregnancy are known to affect maternal health, fetal outcomes, and the emotions and behavior of the infant after birth (3, 4).

It is expected that the father-to-be will support his wife during pregnancy and protect the financial and moral peace of the family. Along with these expectations, the obligations arising from the child may cause anxiety in the father (5, 6). *The aim of this study* is to reveal the effects of pregnancy on the anxiety level of expectant fathers and the factors affecting the anxiety level.

## MATERIAL AND METHODS

This present study is a case-control study conducted on the spouses of pregnant women who were followed up within the health care institutions in Turkey between March-June 2016. In our study, the spouses of 742 women who applied to Kahramanmaraş Sutcu Imam University Health Practice and Research Hospital, Necip Fazıl City Hospital, and Family Health Centers

Polyclinics were informed about the study, and 569 participants agreed to take part in the study. Participants were randomly selected for the study. The informed consent was obtained from the patients under study. Twenty-one patients were excluded from the study because they did not submit the forms or receive psychiatric treatment. As a result, 548 individuals were included, 232 expectant fathers (cases) and 316 men whose spouses were not pregnant (controls).

### *Data collection tools*

STAI (State-Trait Anxiety Inventory 1-2) forms and a questionnaire developed by the researcher were applied to the father candidates. The questionnaire questioned the demographic characteristics of expectant fathers, using of cigarettes and other tobacco products (Maras powder), infertility treatment, sleep quality, experiencing bad events, couple compatibility, and marital and pregnancy characteristics. Maras powder is a smokeless tobacco product used sublingually in Turkey.

During the study, we found it appropriate to apply the STAI-1 (State Anxiety Inventory) and STAI-2 (Trait Anxiety Inventory) forms due to their widespread use, high item homogeneity, high internal consistency, and high reliability over time (7, 8). The State-Trait Anxiety Inventory was developed by Spielberger et al. It was adapted and standardized in Turkey by Oner and Le Compte in 1977, as well as its validity and reliability obtained. Cronbach Alpha ( $\alpha$ ) value was found between 0.94 and 0.96 for the State Anxiety Inventory and between 0.83 and 0.87 for the Trait Anxiety Inventory. The State and Trait Anxiety Inventory is a self-evaluation questionnaire consisting of short statements. The State Anxiety Inventory requires a person to evaluate how they feel at a particular moment and under certain conditions and to respond by considering their feelings about their conditions. The Trait Anxiety Scale, on the other hand, requires the person to evaluate and respond to how they usually feel. These two scales, consisting of twenty questions per each, were applied to the participants on two separate pages and were scored from 1 to 4. Expressed emotions or behaviors intensity is as follows: (1) Not at all, (2) A little, (3) A lot, and (

4) Completely, according to the degree of severity in the State Anxiety Inventory; On the other hand, in the Trait Anxiety Scale, according to the degree of frequency, it is (1) almost never, (2) sometimes, (3) a lot, and (4) almost always (9). Based on the obtained mean anxiety score and standard deviations, as well as considering the relevant literature, it was considered appropriate to have a cut-off score of  $\geq 50$  for the anxiety disorder.

#### *Statistical analysis*

The data analysis used numbers (n) and percentages to summarize categorical measurements, mean and standard deviation (SD) were used for continuous measurements with a normal distribution, and median (min-max) was used for non-normally distributed variables. While comparing STAI-1 and STAI-2 mean scores, the t-test was used to reveal the differences between the two groups, and the analysis of variance (ANOVA) was used to investigate the difference between groups of three and more. Sidak Pairwise Comparison Test was applied to examine the groups with different variant analyses. Statistically,  $p < 0.05$  was considered significant. Logistic regression analysis was used with a cut-off score of 50 and above ( $50 \leq$ ) to investigate whether independent variables affecting STAI 1 and 2 scores were risk factors. While evaluating the findings obtained in the study, the IBM SPSS (Statistical Package for the Social Sciences) 20.0 statistical package program was used.

#### *Ethics committee approval*

Approval was obtained from Kahramanmaraş Sutcu Imam University Faculty of Medicine Clinical Research Ethics Committee, based on decision nr. 14, dated 21.03.2016.

## RESULTS

A total of 548 individuals were enrolled within the study, including 232 expectant fathers (EF) and 316 men with a non-pregnant partners (control). The mean age of the EFs was  $33.7 \pm 6.0$  (min=23, max=51), and the mean age of the controls was  $36.5 \pm 7.1$  (min=23, max=57). Nearly half of EFs (43.9%) and Controls (53.1%) had a university degree. The spouses of 80 EFs (34.8%) were employed; mean STAI-1 scores were  $40.5 \pm 6.6$ , and mean STAI-2 scores were  $41.0 \pm 6.2$ . The spouses of 107 (34.0%) of the controls were employed,

their mean STAI-1 scores were  $37.3 \pm 7.9$ , and their mean STAI-2 score was  $38.0 \pm 7.3$ .

EF and control groups were similar regarding their spouses' education, residence, occupation, income status, social security, and employment status ( $p > 0.05$ ). Of the EFs, 96 (41.9%) come from nuclear families, and 133 (58.1%) from extended families. Of the controls, 199 (63.8%) had nuclear families (a couple and their dependent children), and 113 (36.2%) had extended families (a family that extends beyond the nuclear family). The family type of EFs differed significantly from the Controls frequency ( $p < 0.001$ ). However, there was no significant difference in anxiety scores in STAI-1 ( $t=1.21$  and  $p=0.23$ ) and STAI-2 ( $t=1.91$  and  $p=0.058$ ) forms between EFs and controls with extended family type. There was no difference revealed. The mean STAI-1 score was  $40.0 \pm 7.5$  in fathers who had a postnatal babysitter and  $44.8 \pm 7.3$  in fathers who did not, and the difference was statistically significant ( $p=0.008$ ). When the EF and Control groups were compared regarding the number of children, the ratio of those with no children, one child, and two children was similar. Only the control group had a statistically higher number of children of 3 and above ( $p=0.002$ ). The STAI-1 score of EFs with three or more children was  $41.6 \pm 8.7$ , and the score of Controls was  $38.6 \pm 7.7$  ( $t=0.35$  and  $p=0.044$ ). There was no statistical difference in STAI-2 between EF and Control groups with three or more children ( $p > 0.05$ ). The STAI-2 score of EFs with children aged 0-1 was  $47.7 \pm 9.1$ , and the score of Controls was  $39.1 \pm 6.9$  ( $t=0.78$  and  $p=0.021$ ). No statistical difference was found in the STAI-1 score of EF and Controls with children aged 0-1 ( $p > 0.05$ ). No one in the control group was receiving infertility treatment. Only 28 (12.3%) people had received infertility treatment in EFs (tab. 1). In the EF group, the STAI-1 score for those who received infertility treatment was  $41.4 \pm 6.3$ , and for those who did not –  $41.2 \pm 7.6$ . There was no statistical difference between them ( $p > 0.05$ ). The STAI-2 score of those who received infertility treatment was  $41.0 \pm 9.6$ , and those who did not receive it were  $41.3 \pm 7.2$ . There was no statistical difference between them ( $p > 0.05$ ).

It was determined that the participants in the EF and Control groups showed similar sociodemographic data. It was revealed that dissimilar –

sociodemographic data (family type, having children aged 0-1, having more than three children)

did not cause anxiety for the control group (tab. 1).

Table 1. Sociodemographic characteristics of the participants.

Indicators		EGE n (%)	Control n (%)	P*
Education status	Elementary and below	44 (20.5)	61 (21.0)	0.46
	Senior high school	76 (35.5)	75 (25.9)	
	University and above	94 (43.9)	154 (53.1)	
Residential area	Provincial center	181 (83.8)	232 (85.0)	0.65
	District	21 (9.7)	26 (9.5)	
	Village-Town	14 (6.5)	15 (5.5)	
Income status	Income less than expenses	33 (14.6)	64 (20.6)	0.12
	Income equals expenses	141 (62.4)	183 (58.8)	
	Income more than expenses	52 (23.0)	64 (20.6)	
Partner's employment status	Yes	80 (34.8)	107 (34.0)	0.84
	Not working-Housewife	150 (62.2)	208 (66.0)	
Status of having children	No child	42 (18.1)	39 (12.3)	0.002
	One child	75 (32.3)	76 (24.1)	
	Two child	75 (32.3)	109 (34.5)	
	Three and above child	40 (17.2)	92 (29.1)	
Number of children	Number of 0-1-year- old children	4 (1.7)	59 (18.7)	0.021
	Number of children aged 1-5	13 (5.6)	30 (12.9)	
Family type	Nuclear family	96 (41.9)	199 (63.8)	0.001
	Extended family	133 (58.1)	113 (36.2)	
Infertility Treatment	Yes	28 (12.3)	-	-
	No	199 (87.7)	-	
<b>Total</b>		<b>232 (100.0)</b>	<b>316 (100.0)</b>	

EGE: Expectant fathers, n = frequency, % = column percentage \* Chi-square test

Almost all the EFs (90.9%) evaluated themselves as a compatible couple. The mean STAI-1 scores of those with a compatible couple in the EFs were 40.8±7.1. It was determined that the mean STAI-1 scores of men with a compatible couple in the EFs were lower than those of men who were incompatible with their spouses and said they had no idea (t=2.58, p=0.01). The mean STAI-2 scores of the participants with good sleep quality in the EF group were 39.6±6.6. It was determined that those with good sleep quality had lower average STAI-1 scores than those with poor sleep quality (F=4.02, p=0.019). The mean STAI-1 score of those who experienced a bad event was 41.5±7.5, and the mean STAI-1 score of those who did not experience a bad event was 38.6±7.4. It was determined that the mean STAI-1 scores of those who experienced a bad event were higher than those who did not (t=3.76, p<0.001). About one out of every ten control group members rated themselves as a

compatible couple. The mean STAI-1 scores of those with a compatible couple in the Controls were 38.2±7.2. In the control group, there was no statistical difference between the anxiety scores of the men who evaluated themselves as a compatible couple and those who evaluated themselves as incompatible or having no idea (t=1.32, p>0.05). The mean STAI-1 scores of the participants with good sleep quality in the Control group were 36.1±7.2. It was determined that those with good sleep quality had lower average STAI-1 scores than those with moderate or poor sleep quality (F=6.76, p=0.001). In the control group, the mean STAI-1 score of those who experienced a bad event was 40.7±6.7, and the mean STAI-1 score of those who did not experience a bad event was 37.1±7.3. It was determined that the mean STAI-1 scores of those who experienced a bad event were higher than those who did not (t=3.76, p<0.001). The results of the participants' other risk factors are given in Table 2.



Table 2. Risk factors of participants.

		EF n (%)	Control n (%)
<b>Smoker</b>	Yes	132 (56.9)	129 (40.8)
	No	100 (43.1)	187 (59.2)
<b>No Caregiver After Birth</b>	Yes	43 (18.5)	-
	No	189 (87.9)	-
<b>Using smokeless tobacco (Maras powder)</b>	Yes	28 (12.1)	47 (14.9)
	No	204 (87.9)	269 (85.1)
<b>Social security</b>	Yes	220 (94.8)	296 (93.7)
	No	12 (5.2)	20 (6.3)
<b>Compatible couple</b>	Yes	211 (90.9)	282 (89.2)
	No-No Idea	21 (9.1)	34 (10.7)
<b>Bad event</b>	Yes	47 (20.3)	76 (24.1)
	No	180 (78.9)	239 (75.9)
<b>Good sleep quality</b>	Good	89 (38.4)	117 (37.0)
	Medium	119 (51.3)	159 (50.3)
	Bad	24 (10.3)	40 (12.7)

EF: Expectant fathers, n = frequency, % = column percentage

Based on the STAI-1 form, 7.2% of participants scored 50 and above. Based on the STAI-2 form, 6.0% of participants scored 50 and above. The frequency of anxiety in the EF is 9.9% for STAI-1 form and 10.7% for STAI-2.

The frequency of anxiety in the controls was 5.3% for STAI-1 form and 2.5% for STAI-2 form. Therefore, the spouse's pregnancy can cause anxiety disorders in men. The results obtained are given in Table 3.

Table 3. Comparing the EF and Control groups, based on their form 1 and form 2 scores.

Score	Group	n	Average	SD	Min-max	t	p*
<b>STAI-1 SCORE</b>	EF	232	41.2	7.50	25-71	5.02	0.01
	Control	316	38.0	7.38	20-55		
<b>STAI-2 SCORE</b>	EF	232	41.2	7.53	24-75	4.90	0.01
	Control	316	38.2	6.84	22-54		

EF: Expectant fathers, STAI: State-Trait Anxiety Inventory, \* Student's t-test

In the study, variance analysis was performed to compare the trimester scores of the EF group with form 1 and form 2. The Sidak pairwise comparison test was used to determine the different groups. The obtained results are shown in Table 4 and Figure 1. For expectant

fathers, it was determined that having spouses of Trimester 1, 2, or 3 affected STAI-2 scores (F=4.98, p=0.008). It was determined that the difference was because fathers with spouses in the 1st trimester have higher STAI-2 scores than those in the 2nd and 3rd trimesters.

Table 4. Comparing the trimester and form 1 and 2 scores for the EF group.

Group	Score	Trimester	n	Average	SD	F	p	Dual comparison
<b>EF</b>	STAI-1 Score	0-3. months	46	41.5	7.43	1.47	0.23	
		4-6. months	95	42.0	7.76			
		7-9. months	90	40.2	7.25			
		<b>Total</b>	<b>231</b>	<b>41.2</b>	<b>7.51</b>			
	STAI-2 Score	0-3. months	46	43.8	7.37	4.98	0.008	0-3. months > 4-6 months and 7-9. months
		4-6. months	95	41.6	7.78			
		7-9. months	90	39.6	7.03			
		<b>Total</b>	<b>231</b>	<b>41.3</b>	<b>7.54</b>			

EF: Expectant fathers, STAI: State-Trait Anxiety Inventory, \*Oneway ANOVA

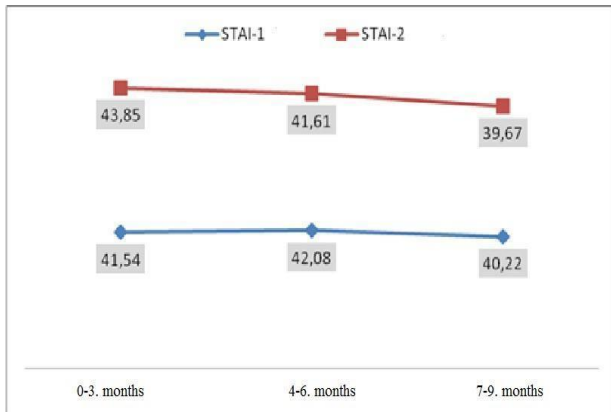


Figure 1. Comparison of STAI form 1 and 2 scores by trimester for the EGE group.

According to Table 5, smoking, having no post-natal caregiver, no social security, and Maras powder were independent risk factors affecting the STAI-1 scale. If the significant variables are interpreted, smoking increases the probability of anxiety 2.5 times, not having a caregiver after birth 1.6 times, using Maras powder 1.5 times, and not having social security 1.2 times.

According to Table 6, variables like smoking, not having a caregiver after birth, and using Maras powder were independent risk factors affecting the STAI-2 scale. If the significant variables are interpreted, smoking status increases the probability of anxiety by 2.3 times, not having a caregiver after birth 1.6 times, and using Maras powder 1.8 times.

Table 5. STAI-1 and risk factors.

MODEL	Wald	p	Odds Ratio	95% GA	
				Lower Limit	Upper Limit
<b>Smoker</b>	8.2	0.01	2.5	1.5	3.3
<b>No Caregiver After Birth</b>	6.9	0.01	1.6	1.2	2.1
<b>Maras powder</b>	2.6	0.02	1.5	0.3	1.9
<b>No Social Security</b>	5.9	0.01	1.2	0.6	1.5

ModelX<sup>2</sup>: 30.13; Success rate = 90%, Cox & Snell R<sup>2</sup>= 0.401

Table 6. STAI-2 and risk factors.

MODEL	Wald	p	Odds Ratio	95% GA	
				Lower Limit	Upper Limit
<b>Smoker</b>	6.6	0.01	2.3	1.4	3.3
<b>No Caregiver After Birth</b>	5.9	0.01	1.6	1.0	2.1
<b>Maras powder</b>	2.9	0.02	1.8	0.9	2.4

ModelX<sup>2</sup>: 26.29; Success rate = 88%, Cox & Snell R<sup>2</sup>= 0.362

**DISCUSSIONS**

Anxiety disorders are among the most common psychiatric disorders and are an important public health problem. According to the Epidemiologic Catchment Area Program (ECA) data, the one-year incidence of anxiety disorders is 10.1%, while its lifetime prevalence is 14.6% (10, 11). While there are many studies on depression, common during pregnancy, in the world and our country, the number of studies on anxiety disorders is very few. Still, we could not find studies on anxiety disorders in men whose spouses are pregnant because of our literature review.

In the compilation of Paulson and Bazemore, the 12-month prevalence of depression in fathers

was found to be 10.4% on average, considering the prenatal period (12). In the study carried out by Wynter et al., in which depression and anxiety disorders were evaluated in fathers together, the frequency of anxiety disorders was 12.2% that was higher than depression (13). In a study conducted by Leach et al. in 2016, the prevalence of men’s anxiety was between 4.1% and 16.0% in the prenatal period (14). In the qualitative study conducted by Serçekuş et al. in Turkey, it was emphasized that prospective fathers are afraid of complications that may develop during child-birth (15).

In the study by Keeton et al. USA, using the STAI-1 scale, the rates of anxiety disorders in expect-

tant fathers were found to be 16% in the third trimester, 12% in the first month postpartum, 16% in the fourth month postpartum, and 18% in the sixth month postpartum (16). In the study of Figueiredo and Conde from Portugal using the STAI-1 scale, the rate of anxiety disorders in expectant fathers was 10.1% in the first trimester, 8.0% in the second trimester, 7.8% in the third trimester, 8.5% between 1 and 3 days after delivery, 4.4% in the third postpartum month (17). In the study of Tohotoa et al. from Australia using the HADS-A scale in expectant fathers, the rate of anxiety disorders was found to be 4.1% during pregnancy and 2.4% in the 6th month after delivery, which was the lowest rate in all studies (18). Therefore, the rate of anxiety disorders during pregnancy was found to be high in all studies of expectant fathers. While the rate of expectant fathers' anxiety disorders in the postpartum period was lower in most studies, Keeton et al. and Condon et al. maintain their rates during pregnancy (16, 19).

Based on the STAI-1 form in our study, 7.2% of participants scored 50 and above. Based on the STAI-2 form, 6.0% of participants scored 50 and above. The frequency of anxiety in the EF was 9.9% for STAI-1 form and 10.7% for STAI-2. Our study found similar rates to those in specialized literature worldwide (16-18).

Considering men with no children and whose spouses are pregnant with their first child, 10.1% of participants scored 50 and above in the STAI-1 form. Based on men with no children and whose spouses are pregnant with their first child, 11.3% of the participants scored 50 and above in the STAI-2 form. Similar rates were found in the study of Quinlivan and Condon conducted during pregnancy in men whose spouses were pregnant with their first child. Thus, the frequency of anxiety disorders is especially higher in men whose spouses are pregnant with their first child. For this reason, as emphasized in Bergström's study on 812 men, more attention should be paid to anxiety disorders, and the necessary social support should be given to young and first-time fathers (20).

Studies on anxiety disorders in fathers have gained more importance and frequency, especially in recent years worldwide. When the average scores obtained from the STAI-1 forms in the

literature worldwide are examined, these vary between 28.8-37.5. Unlike other studies, the average STAI-1 scores found by Latifses are 45.3 and 50.2 (14). Different anxiety scores were obtained in studies. The difference may be due to different study designs (STAI or HADS-A), sociocultural structures, and trimester periods.

Ekelin et al. (21) found the mean STAI-1 score to be  $28.8 \pm 8.7$  in the 2nd trimester and  $29.4 \pm 8.6$  in the 3rd trimester in the study performed on the spouses of 652 pregnant women who came for examination and had expected ultrasonography results. In the survey conducted by Johnson and Baker on men whose spouses were pregnant, the mean STAI-1 score was found to be  $37.5 \pm 9.0$  (22). In the study of Field et al. in the second trimester of men whose spouses were pregnant, the mean STAI-1 score of depressed fathers ( $n=106$ ) was  $44.2 \pm 8.7$ , and the mean STAI-1 score of non-depressed fathers ( $n=50$ ) was  $34.9 \pm 7.7$ , and the mean STAI-1 score of father candidates was  $36.3 \pm 17.9$  detected (23).

In our study, the mean STAI-1 score of the EFs was  $41.2 \pm 7.5$ , the mean STAI-1 score of the controls was  $38.0 \pm 7.3$ , and there was a statistically significant difference between each other ( $t=5.02$ ,  $p<0.001$ ). The mean STAI-2 score of the EFs was  $41.2 \pm 7.5$ , the mean STAI-2 score of the Controls was  $38.2 \pm 6.8$ , and there was a statistically significant difference between each other ( $t=4.90$ ,  $p<0.001$ ).

In our study, the mean STAI-1 score of the EF group was  $41.5 \pm 7.4$  in the first trimester,  $42.0 \pm 7.7$  in the second trimester, and  $40.2 \pm 7.2$  in the third trimester. It was found that there was no statistically significant effect of trimesters on the mean anxiety score according to the STAI-1 form. The mean STAI-2 score of the EF group was  $43.8 \pm 7.3$  in the first trimester,  $41.6 \pm 7.7$  in the second trimester, and  $39.6 \pm 7.0$  in the third trimester. It was determined that spouses in the 1st trimester have higher anxiety levels than those in the second and third trimesters, according to the STAI-2 form ( $F=4.98$ ,  $p=0.008$ ). In our study, anxiety scores were significantly higher in the first trimester compared to STAI-2 scores. Health risks that may arise in the first trimester, such as nausea and vomiting disorders, and lifestyle changes that occur during pregnancy, may have affected first-trimester anxiety scores.

There may have been a decrease in anxiety scores in the 2nd and 3rd trimesters with the adaptation to the lifestyle changes brought about by pregnancy. According to this result, while state anxiety was not significant in the first trimester, trait anxiety was significant.

In the study conducted by Bergström et al. (20), it was found that the risk of depressive symptoms increased in prospective fathers with bad partner relationships. It was determined that the mean STAI-1 scores of men with a compatible couple in the EFs were lower than those of men who were incompatible with their spouses and said they had no idea ( $p=0.01$ ). The study carried out by Field et al. (23), expectant fathers' anxiety, anger, and daily difficulty scores were found to be higher. In our study, it was determined that the mean STAI-1 scores of those who experienced a bad event were higher than those who did not ( $p<0.001$ ). In addition, fathers who were postpartum caregivers had significantly lower STAI-1 anxiety levels ( $p=0.008$ ). Tohotoa et al. (18) found that the anxiety level of fathers who were told about sleep problem-solving strategies decreased. In our study, father candidates with poor sleep were found to have significantly higher levels of anxiety ( $p=0.019$ ). Improving the socioeconomic status of expectant fathers may contribute to reducing their anxiety levels of expectant fathers.

In the prospective study of Alibekova et al., it has been determined that smoker father candidates show more anxiety symptoms before and after birth than non-smoking fathers (24). When we evaluated our study, not assigning a babysitter after birth, smoking, and using Maraş powder were risk factors for anxiety disorders.

It was proved that the average STAI-1 scores in

studies conducted abroad ranged from 28.8-37.5. Our averages were higher than those of the other studies conducted abroad. However, in the handbook of Öner and Le Compte, the mean scores assessed on most Turkish adults using the STAI form were similar to the mean scores obtained in our study (7). Today, in many studies conducted in Turkey using the STAI form, the mean STAI scores of individuals vary between 36 and 53 (25, 26). The difference between the Turkish and international mean scores is probably due to a more emotional structure of Turkish society. In our culture, men are expected to be strong and protective. For this reason, men are more introverted and may not express themselves as openly as women (5). Considering all these, as Öner and Le Compte emphasized, each population should be evaluated within itself and compared with the average scores obtained from healthy individuals (7).

There were some limitations to our study. The clinical interview is the gold standard for diagnosing anxiety disorder. However, the STAI form is the most common anxiety scale preferred worldwide, which is sufficient for self-evaluation survey studies with its high sensitivity. However, since the association between depression and anxiety is common, more useful results can be obtained using another questionnaire that also assesses depression. Another limitation is that since there is no study on the subject in Turkey, comparisons are made with studies abroad, not in Turkish society. In our study, the rate of university graduates was higher. The extended family type was more frequent in EFs. This frequency may be because the caring parents began to live together with the family. Larger field studies are needed to reflect society more accurately.

## CONCLUSIONS

1. Our study found that the frequency and severity of anxiety disorders increased in men whose spouses were pregnant. This difference was particularly evident in young fathers whose spouses were pregnant with their first child. Simultaneously, it was observed that fathers had higher anxiety levels, particularly during the first trimester of pregnancy. Our results show that anxiety disorders during pregnancy are not unique only to women, and expectant fathers also suffer from anxiety disorders.
2. The expectant fathers who had a postnatal babysitter, good sleep quality, and did not experience a bad event, were compatible with wives, and used tobacco derivatives had a significantly lower level of anxiety. Improving the socioeconomic status of expectant fathers may contribute to reducing their anxiety levels of expectant fathers.



3. Patients should also be evaluated psychologically, regardless of the reason for admission, to avoid anxiety disorders, which is a significant public health problem. Expectant fathers may need psychological support during pregnancy. Physicians should evaluate the mother and the father-to-be from a providing psychological perspective.

### CONFLICT OF INTERESTS

The authors declare that they have no conflict of interest regarding the content of this article. The Authors report no financial support regarding the content of this article.

### ACKNOWLEDGEMENT

This article is derived from the specialty thesis in medicine.

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### ETHICAL APPROVAL

Approval was obtained from Kahramanmaraş Sutcu Imam University Faculty of Medicine Clinical Research Ethics Committee with decision number 14 dated 21.03.2016, indicating that there was no ethical and scientific objection to the study.



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**Date of receipt of the manuscript: 20/09/2022**

**Date of acceptance for publication: 29/12/2022**