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Stress and Anxiety in Relation to Amniocentesis: Do Women Who Perceive Their Partners To Be More Involved in Pregnancy Feel Less Stressed and Anxious?

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Aim To assess whether imminent amniocentesis is associated with the perception of increased stress and state anxiety in women and their partners and whether greater partner's involvement during pregnancy alleviates women's stress and anxiety.

Methods Two hundred twenty women awaiting amniocentesis and 90 male partners participated in the study. The State-Trait Anxiety Inventory, Perceived Stress Scale, and Partner's Involvement in Pregnancy Scale were administered. Statistical analysis was performed using *t* test, one way ANOVA, and Pearson correlation test.

Results Imminent amniocentesis caused increased stress (17.6 ± 6.8; $t=7.32$, $P<0.001$) and anxiety (42.0 ± 11.9; $t=8.51$, $P<0.001$) in pregnant women, but not their partners (stress: 14.3 ± 6.1; $t=0.17$, $P=0.862$; anxiety: 36.4 ± 10.40; $t=0.66$, $P=0.510$). Stress was even more pronounced in women who experienced another stressor, like unplanned pregnancy, prenatal-related nausea and vomiting, or chromosomal aberration in a previous pregnancy. Significant negative correlation was found for women's stress and their perception of their partner's involvement during pregnancy ($r=-0.23$; $P=0.001$); the same was not found for women's anxiety.

Conclusion Greater partner's involvement during pregnancy could diminish women's stress, but elevated state anxiety just before amniocentesis could not be alleviated in the same way. Thus, health care professionals must pay greater attention to the psychological status of women undergoing amniocentesis to help them better cope with the situation.

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Invasive diagnostic techniques, such as chorionic villi sampling or amniocentesis, are offered in situations where there is a high risk for aneuploidy. Anxiety regarding amniocentesis has been well researched, and higher anxiety levels are observed in women undergoing amniocentesis than in those who do not undergo this procedure (1-4). Women's anxiety is influenced both by the procedure and by the perceived likelihood of an abnormal result (5). However, psychological and social aspects of women's life may also contribute to the level of anxiety. Social, particularly partner's, support is unique in its ability to contribute to both better and worse prenatal adjustment. Pregnant women who perceived to receive more effective support from their partner experienced less anxiety, both concurrently and prospectively (6). However, husband's support was found to be more effective in low-risk than in high-risk pregnancies (7). A perceived lack of husband's support could be related to his low awareness of the stressfulness of the situation and low involvement in it (7).

In contrast to women's psychological response to amniocentesis, little is known about their partner's reaction to the same situation. Moreover, the concomitant effect of partner's involvement during pregnancy on women's stress and anxiety just before amniocentesis has never been reported. Thus, the aim of the present study was to assess whether awaiting amniocentesis is associated with an elevated perception of stress and state anxiety in both women and their partners, and to explore the concomitant effects of the partner's involvement during pregnancy on women's stress and anxiety. We hypothesized that imminent amniocentesis was anxiogenic for both women and their partners, and that women whose partners were more involved in pregnancy were less stressed and anxious.

PARTICIPANTS AND METHODS

Participants

The study was conducted from November 1, 2007, to October 30, 2009, at the Department of Obstetrics and Gynecology, Clinical Hospital Center Rijeka, Croatia. Seven hundred and eighty women underwent amniocentesis. The psychologist was present at 253 (32.4%) of these interventions. Out of 253 invited couples, 220 women (87%) and 90 (36%) male partners agreed to participate. All participants provided written informed consent and the protocol was approved by the institutional ethics committee. The mean age (±standard deviation) of the women was 36.3 ± 4.4 (range, 19-47) years and of their partners 37.3 ± 5.4 (range, 26-52) years. The mean gestational age at the time when participants completed the questionnaires was 17.0 ± 1.3 weeks. The mean time women spent with theirs partners was 6.9 ± 5.3 (range, 0.2-22) years.

Procedure

Participants were approached by a researcher when they first came to the clinic for their amniocentesis appointment. The aim of the study was explained to participants and they gave informed consent. After this, they completed the General Information Questionnaire, Perceived Stress Scale (PSS), State Anxiety Scale, and Partner's Involvement in Pregnancy Scale (PIPS). Men who accompanied their partners were also asked to complete the forms. Women stayed in hospital and the amniocentesis was performed the next morning.

Measures

The Perceived Stress Scale. The PSS is the most widely used tool to measure the global perception of stress in relation to various psychological responses and health-related outcomes (8). This scale measures the extent to which the subjects experience their lives as uncontrollable, unpredictable, and overburdening, which are the crucial components of experiencing stress (9). In this study, the PSS was used to measure the perception of stress during the week preceding the amniocentesis. It contains 10 items on a 5-point Likert scale, ranging from 0 (never) to 4 (very often). The total scores range from 0 to 40, with a higher score indicating a greater perception of stress. The internal consistency of PSS in this study was $\alpha = 0.82$ for women and $\alpha = 0.77$ for men.

State-Trait Anxiety Inventory. The State-Trait Anxiety Inventory consists of two anxiety scales (10). Only the State Anxiety Scale was used in this study. The State Anxiety Scale is, among others, a sensitive indicator of the anxiety people experience during inevitable real-life stressors. It contains 20 statements assessing how a person feels right now. Items are scored on a 5-point Likert scale ranging from 1 (not at all) to 4 (very). The total scores range from 20 to 80, with higher scores indicating greater anxiety. The internal consistency of anxiety scores in our data set was $\alpha = 0.94$ for women and $\alpha = 0.92$ for men.

Partner's Involvement in Pregnancy Scale. The PIPS was designed specifically for the purpose of this study. It contains 20 items that measure the degree of partner's support, attention, and involvement in making decisions regarding

pregnancy. The scale has two parallel forms: one for women and one for men. The first measures women's perception of their partner's involvement and the second scale measures men's perception of their own involvement in pregnancy. Items are scored on a 5-point Likert scale ranging from 1 (not at all) to 5 (very much). The factor structure and reliability of the newly designed scale were verified in a pilot study in 210 pregnant women and their partners. An exploratory factor analysis with oblimin rotation was conducted on data for women and men separately. Cattell scree test suggested extraction of two factors. Two factors explained 38.3% of the variance in the PIPS score for women and 31.6% of the variance in the PIPS score for men. Cronbach α coefficient was 0.86 (women) and 0.83 (men) for the first factor and 0.80 (women) and 0.77 (men) for the second factor. Correlation between two factors was almost zero (r=-0.03), indicating that these two dimensions are independent. The first factor contains 15 items describing support, attention, and involvement in making decisions on pregnancy. Examples of items from this factor are the following: "My partner supports me from the beginning of the pregnancy;" "My partner talks to me about my feelings about the pregnancy;" "My partner is involved in all decisions about the pregnancy." This factor was named Support. Factor scores range from 15 to 75, with higher scores indicating greater perception of support. The second factor contains 5 items which describe distancing from the pregnant women and decisions about the pregnancy. Examples of items from this factor are the following: "My partner isn't familiar with the development of my pregnancy;" "My partner shows no interest in going through the pregnancy course with me." This factor was named Distance. Scores range from 5 to 25, with higher scores indicating greater distance. Internal consistency in the sample of the present study (220 women and 90 men) was also satisfactory (Support: α=0.88 in women and α=0.83 in men; Distance: α=0.70 in women and α=0.75 in men).

General Information Questionnaire. Demographic data and clinical characteristics of the pregnancy were collected with the General Information Questionnaire. Data included age, education level, occupation, marital status, number of years women lived with their partner, income, parity, pregnancy planning, indication for amniocentesis, and pregnancy complication.

Statistics

SPSS, version 15.0 (SPSS Inc, Chicago, IL, USA) and Statistica, version 8 (Statsoft, Tulsa, OK, USA) were used for data analysis. Differences between groups were examined using the *t*-test and one way analysis of variance (ANOVA). Pearson correlation was applied to examine the bivariate relationship among variables. A *P* value of <0.05 was considered significant.

RESULTS

Stress and anxiety levels – comparison with norms

Mean stress score was 17.6±6.8 (range, 0-37) for women and 14.3±6.1 (range, 1-29) for men. Norms for healthy adults range from a mean of 11.9±6.9 for age group 55-64 years to 14.2±6.2 for age group 18-29 years (11). Women's stress scores were significantly higher than the highest norm for the PSS, but not men's scores (women: t=7.32; *P*<0.001; men: t=0.17; *P*=0.862).

The mean anxiety score in women awaiting amniocentesis was 42.0±11.9 (range, 20-78), which was considerably higher than the norms (35.72±10.40) (10), (t=8.51; *P*<0.001). The mean anxiety score in men (36.4±10.40; range, 20-67) was not different than that of the norms (35.20±10.61) (10), (t=0.66; *P*=0.510). No significant difference was found in the level of anxiety among women whose partners were interviewed and those who were not (41.4±12.6 and 42.4±11.4, respectively; t=0.62; *P*=0.537). The same finding was obtained for the stress score (17.26±7.61 and 17.76±6.22, respectively; t=0.53, *P*=0.597).

Stress and anxiety with regard to demographic characteristics and clinical characteristics of pregnancy

Table 1 shows stress and anxiety scores reported by women who underwent amniocentesis (n=220) and their partners (n=90), according to demographic characteristics and clinical characteristics of pregnancy. Using one way ANOVA, no significant differences in anxiety were found between different demographic categories in either women or men. Women's and men's anxiety levels were not different according to the indications for amniocentesis.

Women who had pregnancy complications such as threatened abortion (43.2±12.2) or pregnancy-related nausea and vomiting (PRNV) (45.7±12.1) had significantly higher anxiety level than those who had an uncomplicated pregnancy (38.9±10.7) (F=8.26; *P*<0.001). There were not any differences in anxiety among men according to any of the observed demographic characteristics or clinical characteristics of pregnancy. Women who had

unplanned pregnancy experienced significantly higher stress (18.79 ± 6.4) than those who had planned pregnancy (16.88 ± 6.9) (F = 4.04; P = 0.046). Women's stress was significantly different according to the indication for amniocentesis (F = 2.84; P = 0.039). Women who underwent amniocentesis because of chromosomal aberration in previous pregnancy reported the highest stress score (22.29 ± 7.6). Women's stress was significantly different also for pregnancy complications (F = 3.29; P = 0.039). The highest level of stress was reported by the group who experienced PRNV (19.01 ± 7.3), as was the case with anxiety. Men's stress score was significantly different according to education level (F = 4.74; P = 0.011) and the pregnancy complication (F = 3.69; P = 0.029). Men with 2-year college education (10.93 ± 4.7) and those whose wives had threatened abortion (10.82 ± 6.5) experienced the lowest level of stress.

Differences between women and men in anxiety, stress, and perception of partner's involvement in pregnancy

In order to compare the perception of stress, state anxiety score, and perception of involvement in pregnancy

TABLE 1. Stress and anxiety reported by women undergoing amniocentesis (n = 220) and their partners (n = 90) according to the demographic characteristics of the couple and the clinical characteristics of the pregnancy

	Women n (%)	Women's anxiety (mean±SD)	f;*P*	Women's stress (mean±SD)	f;*P*	Men n (%)	Men's anxiety (mean±SD)	f;*P*	Men's stress (mean±SD)	f;*P*
Education level:			0.88;0.451		1.40;0.243			1,33;0.269		4.74;0.011
primary	12 (5)	39.6 ± 9.5		16.50 ± 7.1						
secondary	121 (55)	42.1 ± 12.4		17. 99 ± 6.4		57 (63)	36.3 ± 10.7		14.18 ± 5.9	3-4†
2-y college	29 (13)	44.8 ± 11.1		15.31 ± 6.9		14 (16)	33.3 ± 10.8		10.93 ± 4.7	
university	58 (27)	40.9 ± 11.5		18.00 ± 7.5		19 (21)	39.2 ± 8.8		17.21 ± 6.0	
Work status:			0.27;0.605		0.33;0.569			0.17;0.681		0.04;0.853
unemployed	22 (10)	40.8 ± 9.2		16.77 ± 6.3		3 (3)	34.0 ± 12.8		17.82 ± 5.7	
employed	198 (90)	42.5 ± 12.2		17.65 ± 6.9		87 (97)	36.5 ± 10.4		13.82 ± 5.9	
Marital status:			0.28;0.597		2.12;0.147			0.15;0.701		0.01;0.913
not married/cohabiting	12 (5)	40.3 ± 11.6		20.33 ± 6.2		5 (5)	38.2 ± 10.8		14.60 ± 7.3	
married	208 (95)	42.2 ± 11.9		17.39 ± 6.8		85 (95)	36.3 ± 10.4		14.29 ± 6.0	
Monthly income (€):			0.63;0.597		1.87;0.135			0.17;0.915		0.83;0.484
<500	12 (5)	46.0 ± 12.3		19.75 ± 6.1		4 (5)	38.8 ± 10.7		14.75 ± 4.3	
500-1000	78 (36)	42.5 ± 11.7		18.53 ± 5.6		28 (31)	35.5 ± 11.1		13.18 ± 6.6	
1000-1500	62 (28)	41.2 ± 11.6		16.15 ± 7.3		28 (31)	37.1 ± 11.4		15.68 ± 5.6	
>1500	68 (31)	41.5 ± 12.4		17.35 ± 7.6		30 (33)	36.4 ± 9.1		14.03 ± 6.2	
Parity:			0.13;0.942		1.21;0.306			0.61;0.609		0.06;0.979
0	85 (39)	42.2 ± 12.9		18.34 ± 7.3		41 (45)	35.9 ± 10.9		14.34 ± 6.4	
1	94 (43)	41.8 ± 10.9		17.17 ± 6.2		38 (42)	37.4 ± 10.1		14.13 ± 5.8	
2	29 (13)	42.8 ± 12.6		15.93 ± 6.5		5 (6)	31.4 ± 8.9		15.40 ± 5.5	
≥3	12 (5)	40.5 ± 10.9		19.00 ± 8.2		6 (7)	38.7 ± 10.6		14.33 ± 7.1	
Pregnancy planning:			1.11;0.294		4.04;0.046			0.02;0.895		1.17;0.283
planned	142 (65)	41.4 ± 12.1		16.88 ± 6.9		65 (72)	36.5 ± 10.6		14.74 ± 6.1	
unplanned	78 (35)	43.2 ± 11.5		18.79 ± 6.4		25 (28)	36.2 ± 10.2		13.20 ± 6.0	
Pregnancy complication:			8.26;0.000		3.29;0.039			0.98;0.379		3.69;0.029
uncomplicated	107 (49)	38.9 ± 10.7		16.46 ± 6.5		38(42)	38.2 ± 11.1		15.18 ± 5.3	
threatened abortion	33 (15)	43.2 ± 12.2	1-3**	17.61 ± 5.9	1-3**	17(19)	35.0 ± 10.1		10.82 ± 6.5	1-2†
pregnancy-related nausea and vomiting	80 (36)	45.7 ± 12.1		19.01 ± 7.3		35(39)	35.1 ± 9.8		15.06 ± 6.1	
Reason for amniocentesis:			0.81;0.488		2.84;0.039			1.08;0.362		0.73;0.535
maternal age	162 (74)	41.4 ± 11.5		16.89 ± 6.7		61 (68)	36.6 ± 10.5		13.90 ± 6.1	
positive screening test for Down syndrome*	37 (17)	43.2 ± 11.4		19.62 ± 6.8		17 (19)	38.0 ± 10.5		16.06 ± 6.4	
chromosomal aberration (previous pregnancy)	7 (3)	47.0 ± 12.8		22.29 ± 7.6		3 (3)	41.0 ± 6.0		16.00 ± 8.2	
mental retardation in family	14 (6)	44.0 ± 16.7		17.43 ± 5.9		9 (10)	31.2 ± 10.5		13.22 ± 4.9	

*Biochemical and ultrasound screening test for Down syndrome.
†Post Hoc Test (Sheffé test).

TABLE 2. **Anxiety, stress, women's perception of their partner's involvement and the partner's perception of their own involvement during pregnancy (n = 90 couples)**

	Women	Partners	t; *P*
Anxiety	41.4 ± 12.7	36.4 ± 10.4	3.06; 0.003
Stress	17.3 ± 7.6	14.3 ± 6.1	3.29; 0.001
Women's perception of partner's support	64.4 ± 8.9		
Partner's perception of their own support		66.1 ± 6.6	2.20; 0.030
Women's perception of partner's distance	10.6 ± 4.4		
Partner's perception of their own distance		10.6 ± 4.9	0.11; 0.913

TABLE 3. **Correlation matrix of predictor variables (women's perception of partner's support and distance during pregnancy, partner's perception of their own support and distance) and women's anxiety and stress.**

	Women's anxiety (r; *P*)	Women's stress (r; *P*)
Women's perception of support	-0.12; 0.074	-0.23; 0.001
Women's perception of distance	0.03; 0.630	0.11; 0.119
Partner's own perception of support	-0.06; 0.661	-0.00; 0.968
Partner's own perception of distance	0.03; 0.771	0.13; 0.224

in 90 couples, ***t***-tests for dependent samples were performed. Table 2 summarizes the results of women's and men's anxiety, stress, women's perception of her partner's involvement, and men's perception of their own involvement in pregnancy. Women reported significantly higher levels of anxiety than their partners ($t = 3.06$; $P = 0.003$), but there were no significant correlations between women's and their partners' anxiety ($r = 0.12$; $P = 0.257$). The level of stress was also significantly higher in women than in their partners ($t = 3.29$; $P = 0.001$), and positive correlations between the stress reported by partners were found ($r = 0.24$; $P = 0.025$).

The mean PIPS score for women's perception of their partner's support during pregnancy was 64.4 ± 8.9 (Table 2). Although the correlation was highly positive ($r = 0.57$; $P < 0.001$), men identified themselves as being more supportive in pregnancy (66.1 ± 6.6) than their partners perceived them to be ($t = 2.20$; $P = 0.030$). No significant difference between women's and their partners' perception of distance during pregnancy was found ($t = 0.11$; $P = 0.913$), and their PIPS scores were positively correlated ($r = 0.47$; $P < 0.001$) (Table 2). There was no significant difference in the perception of either support (64.4 ± 8.9 and 62.2 ± 8.7; $t = 1.8$, $P = 0.069$) or distance (10.6 ± 4.4 and 11.1 ± 4.5; $t = 0.7$, $P = 0.488$) between women whose partners were interviewed and those whose partners were not interviewed.

Correlations between partner's involvement during pregnancy and women's stress and anxiety

In order to explore the concomitant effects of the partner's involvement during pregnancy on women's stress and anxiety, correlations were calculated (Table 3). Women's anxiety was not significantly correlated with either their perceptions of their partner's support and distance during pregnancy or with the partner's own perceptions of such behaviors. Significant negative correlations were found only between women's stress and women's perception of their partner's support ($r = -0.23$; $P = 0.001$). Women who perceived more support from their partners reported lower perception of stress.

DISCUSSION

Our study demonstrated that pregnant women awaiting amniocentesis reported elevated stress and state anxiety. This was not, however, the case with their partners. Similar finding was reported by other studies (1-4,12). We did not find significant differences in women's stress and anxiety according to demographic characteristics, such as education level, work status, marital status, monthly income, or parity. The novel finding of our study was that there were significant differences in stress among groups with different reasons or indications for amniocentesis. The highest level of stress was observed in women who came to amniocentesis because of chromosomal aberration in a previous pregnancy. The highest stress in that group was not surprising since 5 out of 7 cases included in the group were related to trisomy 21. We could not find similar studies in the literature, except for a study reporting higher levels of state anxiety in women undergoing amniocentesis because of soft ultrasound markers for aneuploidy (eg, nuchal thickness, choroids plexus cysts, echogenic bowel, shortened long bones) or abnormal maternal serum screening than in women of advanced age (13). Although not significant, our results showed a gradual increase in the anxiety level from the group with the advanced age, to the group with high risk determined with non-invasive prenatal tests, and the group with a chromosomal aberration in a previous pregnancy (Table 1). The same gradation was present in the stress level, but the scores were significantly different. Our results also showed significantly higher levels of both stress and anxiety in the group of women who experienced PRNV than in the group of wom-

en who had uncomplicated pregnancies or who had to be confined to bed rest because of a threatened abortion. It is well known that PRNV is a major health problem in the first trimester and about 9% of women continue to have symptoms beyond 20 weeks of gestation (14,15). The relationship between PRNV and higher perceived stress and anxiety in an otherwise normal pregnancy is now well documented (16,17). Furthermore, women in our study who reported an unplanned pregnancy also reported more stress and anxiety, although the difference was significant only for the stress score. Psychological response to imminent amniocentesis is stronger in women who had an unplanned pregnancy, PRNV, or a chromosomal aberration in a previous pregnancy. This especially applies to the stress score; thus, health care professionals should devote more attention to such women. This is all the more important because the most effective support in high risk pregnancy comes from the woman's physician or her mother rather than from her partner (7,18,19). In contrast to the women in our study, their partners did not report either greater state anxiety or greater stress than normal, and their levels were significantly lower than that of their partners (10,11). However, significant differences were found in men's stress score according to their educational level and pregnancy complication, which was lowest in men with a 2-year college education and in cases of threatened abortion. It is difficult to provide an explanation for this; however, we believe that the results are coincidental because of the small number of cases. While there was no correlation in anxiety levels in both partners, the correlation with stress score was significant and positive.

A few papers address the feelings of men awaiting invasive or non-invasive prenatal tests, and all reported significantly lower stress and anxiety scores in men than in their pregnant partners (12,20,21). Kowalcek et al reported men's tendency toward more depressed reactions before an ultrasound examination than before amniocentesis or chorionic villus sampling (12). They assumed that visualization of the fetus brought men into a closer relationship with the child, which made them vulnerable to the current situation.

We also assessed the effect of partner's involvement during pregnancy on women's stress and anxiety prior to amniocentesis. Using PIPS, which was developed for the purpose of the present study, we found that women perceived their partners to be very involved in the pregnancy, and there was significant positive correlation between PIPS scores reported by both partners. Not surprisingly, men in the present study identified themselves as being more involved in pregnancy than their female partners perceived them to be, since a specific highly-stressful situation requires more special attention, and partner's involvement can be perceived to be less effective (6). Women who perceived their partners to be more involved reported lower level of stress. Previous research also found that prenatal social support was negatively associated with stress (19,22). Surprisingly, we did not observe the same correlation for state anxiety. Our results showed that women's anxiety was not significantly correlated with perception of their partners' involvement in pregnancy or to the partners' perception of their own involvement. This may be because of differences in measuring anxiety and stress in this study. Namely, the anxiety measure was focused on current anxiety and the stress measure was focused on the perception of stress during the past week. It is possible that partner's involvement was sufficient in reducing the stress during the week before amniocentesis but not immediately before the procedure. It is also possible that men's lack of direct participation or lack of knowledge about amniocentesis made them perceive themselves as spectators rather than equal participants.

Certain limitations of the present study should be acknowledged. Firstly, the sample was a convenient one and depended on the presence of the psychologist at the scheduled amniocentesis. Another limitation is that only those participants who wished to participate were included, particularly men. The main reported reason why men refused to participate in the study was a lack of time (73%). The rest of them did not want to participate at all. Here, we have to note that scores of anxiety, stress, and PIPS were not significantly different among women whose partners were interviewed and those who were not. Additionally, PIPS is a new self-report questionnaire, which should be further evaluated. This study also examined the relationship between stress, anxiety, and partner's involvement in pregnancy at a single time point and did not consider the changes in this relationship during different stages of pregnancy, which would require a longitudinal study.

In conclusion, this study demonstrates that imminent amniocentesis causes elevated stress and anxiety in pregnant women but not in their partners. Stress is even more pronounced in women who experienced another stressor in addition to amniocentesis, like an unplanned pregnancy, PRNV, or a chromosomal aberration in a previous pregnancy. Greater partner's involvement in pregnancy could buffer women's stress, but not the elevated state anxiety.

Thus, it is important that health care professionals, especially psychologists, pay greater attention to the psychological status of women and help them better cope with anxiogenic situations such as amniocentesis.

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