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# Evaluation of the effect of education on perceived stress of mother candidates for amniocentesis

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**Abstract:**

**BACKGROUND:** Amniocentesis is one of the methods for diagnosing prenatal abnormalities. Pregnant women with high-risk fetal screening results are the candidates for amniocentesis. Most of these women are afraid of this procedure because they predict that the test will be painful and worried about its adverse effects on pregnancy, fetal injury, or the risk of maternal death. Therefore, the aim of this study was to determine the effect of education on the perceived stress of mothers who are the candidates for amniocentesis.

**MATERIALS AND METHODS:** The present study was a quasi-experimental, two-group clinical trial with a parallel design. This study was in three stages: pretest (before intervention), posttest (after intervention), and after amniocentesis. This study was performed on 80 pregnant women who were the candidates for amniocentesis (15–20 weeks of pregnancy) with high-risk fetal screening results referred to the perinatology clinic in Yazd in 2020. The intervention package included training and using breathing techniques, broadcasting educational animations on how to perform amniocentesis, expressing experiences by people who had experienced amniocentesis, and finally visiting the amniocentesis site and getting to know the relevant perinatologist. Data collection tools were demographic and midwifery profile questionnaires and Cohen perceived stress. SPSS software version 16 was used for statistical analysis of data.

**RESULTS:** The results showed that the research units had high stress at the beginning of the study. The perceived stress score at the beginning of the study in the intervention group was  $30.1750 \pm 6.53153$  and in the control group was  $28.2750 \pm 8.57841$ . After the intervention, the participants' stress level decreased below the cutting point. In the experimental group, the mean stresses after the intervention and after amniocentesis were significantly lower than before the intervention; however, after amniocentesis, it was somewhat higher than the postintervention stage. In the preintervention stage, the mean stress score between the two groups was not statistically significant. The difference after the intervention between the two groups was significant ( $P < 0.01$ ); however, in the postamniocentesis stage, the difference in stress was not significant. After the intervention and after amniocentesis, the perceived stress of pregnant mothers in the experimental group was less than the control group.

**CONCLUSION:** Considering that the perceived stress in amniocentesis candidate mothers was high in the present study, so that after performing the method, mothers left the center with high stress, it is very important to pay attention to its psychological aspects. Therefore, it is suggested that educational interventions before and during amniocentesis be considered for them along with psychological support and follow-up care after amniocentesis.

**Keywords:**

Amniocentesis, education, perceived stress

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## Introduction

Prenatal diagnosis of fetal malformations is a stressful event for pregnant women. Congenital malformations and genetic diseases threaten the life and death of about 3% of infants.<sup>[1]</sup> The only way to prevent the birth of babies with chromosomal abnormalities is prenatal diagnosis. These disorders are now assessed by screening tests that are part of prenatal care worldwide.<sup>[2]</sup> Screening tests put mothers into three groups in terms of the risk of fetal malformations. In the high-risk group, these women are advised to have an invasive diagnostic test, such as an amniocentesis or chorionic villus sampling, and to karyotype fetal tissue. Low-risk people, who do not need another test, and the last group of women are at moderate risk who should undergo tests in the second trimester of pregnancy.<sup>[3]</sup> Amniocentesis is a well-known and accessible method for prenatal care. Amniocentesis is the most widely used prenatal diagnostic procedure in which amniotic fluid is extracted through the transabdominal in 15–20 weeks. This method can examine fetal genetic disorders, congenital infections, alloimmunization, and fetal lung maturation.<sup>[4]</sup> Among the indications for performing amniocentesis is the diagnosis of chromosomal, genetic, and metabolic disorders, following positive screening tests or their positive family history, maternal age, and ultrasound findings. In addition to their benefits, these methods are associated with complications such as fetal death, rupture of membranes, vaginal bleeding, and chorioamnionitis.<sup>[5]</sup> The risk of losing a fetus in this procedure is <1%. Amniocentesis in obese women with a body mass index above 30 carries about a 2% risk of miscarriage. In 1%–2% of cases, there is a possibility of amniotic fluid leakage or transient spotting after 48 h of amniocentesis in 90% of people. Fetal injury caused by needles is rare. Cultivation is successful in 99% of cases. Lack of culture or reduced cell growth is associated with the possibility of abnormal fetuses. Early amniocentesis is performed at 11–14 weeks, which is difficult due to the lack of attachment of the amniotic and chorionic layers to the uterus and has more surgical-related complications. There is a possibility of echinococcus (clubfoot), amniotic fluid leakage, and miscarriage. As a result, this type of amniocentesis is not recommended.<sup>[3]</sup> Pregnant women who are the candidates for amniocentesis are often afraid of this procedure because they anticipate the test as painful and are concerned about the possibility of adverse outcomes, the birth of a disabled child, fetal injury, or the risk of maternal death.<sup>[6]</sup> In the study of Abedi *et al.*, high levels of anxiety and stress were expressed in amniocentesis candidate mothers.<sup>[7]</sup> Stress is a person's reaction to external pressures or unfavorable conditions. Anxiety is one of the most common side effects of stress. Stress is an experiencing event that is considered dangerous to a person's physical or mental

well-being. Stress is one of the explanatory components of the possibility of coping styles by people in stressful situations. Perceived stress is one of the factors that can play a role in many diseases and disorders or alleviate the conditions for diseases and disorders. Perceived stress intensity refers to a person's belief that stress is serious.<sup>[8]</sup> Stress at the individual level causes physical and mental injuries and at the social level causes and aggravates social problems.<sup>[9,10]</sup> Coping with stress is a response to thoughts, feelings, and actions that a person uses to deal with problematic situations.<sup>[9-11]</sup> If a woman can cope with stress, she will probably be safe from its adverse effects on her health,<sup>[12-15]</sup> and if the adaptation to stressful conditions is not formed well, negative emotions and even irreversible psychological problems will occur.<sup>[16]</sup> Providing adequate information and awareness about screening is a powerful and effective part in its acceptance by the pregnant mother and can reduce the stress caused by it.<sup>[17]</sup> Stress management methods include a set of activities that include getting help from others to get things done, embracing the support of others, being realistic, considering success, exercising (walking, running, etc.), proper nutrition, sleep and rest, healthy recreation, travel, laughing, writing down your thoughts and feelings, and accepting yourself. In fact, the way to deal with stress is the process of how a person copes with events and happenings that is used to successfully cope and adapt to the appropriate environmental conditions and interactions.<sup>[18]</sup> According to the results of studies, fetal health has been the main cause of concern for mothers and most pregnant women are worried about fetal abnormalities and screening tests.<sup>[19]</sup> Therefore, educating and informing pregnant women can be a good tool to control their stress and anxiety before amniocentesis.<sup>[19]</sup> Studies show that pregnant women who have access to counseling services are more accepting of screening tests and have fewer negative psychological consequences.<sup>[14]</sup> Although the psychological impact of diagnostic invasive tests is very important, they have received less attention<sup>[3]</sup> and there is limited evidence on the effectiveness of prenatal counseling.<sup>[20]</sup> Training before taking any action can inform people about the procedure, risks, benefits, and all necessary actions. On the other hand, mothers' awareness reduces their worries and stress and they take measures more effectively. Therefore, since one of the roles of midwives is to provide care and education during pregnancy and psychological support of mothers, so this study was conducted to determine the effect of education on the perceived stress of mothers of amniocentesis candidates.

## Materials and Methods

The present study was a two-group clinical trial with a parallel design. This study was in three stages:

pretest (before intervention), posttest (after intervention), and after amniocentesis. This study was performed on pregnant women candidates for amniocentesis referred to the perinatology clinic in Yazd in 2020. The sample consisted of 80 pregnant women who were the candidates for amniocentesis who met the inclusion criteria and gestational age of 15–20 weeks. Sampling was done purposefully according to the objectives of the research and inclusion conditions. In this study, the sample size was calculated according to the following formula by considering the difference of at least five points in the average of the two groups. The number of samples for each group was 36 people. The number of final sample volumes was considered as 40% in each group, taking into account 10% of sample loss.

$$n = \frac{2s^2 p \left[ z_{1-\alpha/2} + z_{1-\beta} \right]^2}{\mu^2 d}$$

Inclusion criteria were Muslim and Iranian, having written consent to participate in the study, having a minimum literacy, candidate for amniocentesis, gestational age (based on the 1<sup>st</sup> day of the last menstrual period or first trimester ultrasound) 15–20 weeks, single pregnancy and live fetus, and positive fetal screening result (abnormal laboratory results or ultrasound findings). Exclusion criteria at the beginning of the study were pregnancy following infertility treatment and assisted reproductive techniques, history of amniocentesis, history of recurrent miscarriages (three or more consecutive abortions), presence of major abnormalities in ultrasound, awareness about the details of amniocentesis, use of hookah, cigarettes, drugs, alcohol, psychotropic drugs, history of referring to a psychiatrist or psychologist for mood and mental disorders, taking medication, or hospitalization due to mental illness. Exclusion criteria during the study were unwillingness to continue cooperation and participation in the study and incomplete completion of questionnaires (in the case of the main variables, and all questions had to be answered). In the Cohen perceived stress questionnaire, 90% of the questions had to be answered, not given amniocentesis for any reason, and need to repeat amniocentesis.

The data collection tool in this study was questionnaires. The questionnaires were demographic and midwifery information questionnaire and Cohen perceived stress questionnaire.

The demographic and midwifery information questionnaire consisted of two parts: (a) demographic information (including age, education, occupation, and satisfaction with the economic situation) and (b) midwifery characteristics (including gestational age,

number of pregnancies and deliveries, number of live and dead children, number of abortions, stillbirth and infant death, existence of fetal or neonatal abnormalities in previous pregnancies, and cause of amniocentesis).

Cohen perceived stress questionnaire was first developed by Cohen *et al.* in 1938. This tool is suitable for determining the extent to which people recognize their stress in dealing with unpredictable and uncontrollable events in life. The perceived stress questionnaire has 14 questions. The answers are in the form of five Likert options. For each option, a score of 0–4 (0 = never, 1 = rarely, 2 = sometimes, 3 = most of the time, 4 = all the time) is considered. For positive questions (13, 10, 9, 7, 6, 5, 4), the scores are calculated inversely. The score range is between 0 and 56. The cutoff score is 21.8. The higher the score obtained, the higher the perceived stress.<sup>[3]</sup> This questionnaire has been used many times in domestic studies, which is approved.<sup>[3]</sup> This research was started after the approval of the research council in the Faculty of Nursing and Midwifery and obtaining the code of ethics from the ethics committee of Shahid Sadoughi University of Medical Sciences (Yazd, design code IR.SSU.REC.1398.088 approved on June 21, 2019). Necessary letters of introduction were also taken and presented to the relevant authorities. At first, sufficient explanations about the goals and stages of the research were given to all participants in the two groups of control and intervention, and after receiving informed consent and assuring the clients (pregnant women candidates for amniocentesis) about the confidentiality of information, sampling was performed. Before the intervention, demographic characteristics questionnaire and Cohen perceived stress (pretest) questionnaire were completed by all participants in the intervention and control groups. In the intervention group, the intervention package was performed as group training in four groups of 10 people 90 min before the amniocentesis in the training class of the center with the presence of 40 pregnant women who met the inclusion criteria. Educational materials based on the midwifery scientific texts and review of studies were presented as follows. First, the researcher introduced himself/herself and explained the objectives of the study. After communicating effectively with the participants, the researcher gave a brief description of the diagnostic method of amniocentesis, how it is performed, indications, possible complications after amniocentesis, and how to deal with it. Then, the research units expressed their sensitivities about amniocentesis. Participants then talked about the causes and factors of stress, and the researcher clarified what was causing the concern. Then, training and use of breathing techniques and individual participation were discussed. In the next stage, an educational animation on how to perform amniocentesis was broadcast to the experimental group. Finally, the person who had previously undergone amniocentesis

was asked to share their experiences in this area. After the training session, the amniocentesis site was visited and the relevant perinatologist was introduced. The control group received routine care. Routine care included brief descriptions of the amniocentesis provided by the perinatologist at the time of amniocentesis. The stress questionnaire was completed by both groups before the intervention, after the intervention, and after amniocentesis. Amniocentesis of all research units under ultrasound guide was performed by a spinal needle No. 22 made in Japan with a length of 9 cm and by a single perinatologist. After disinfecting the mother's abdomen with betadine antiseptic fluid, amniocentesis was performed and 20 cc of aspirated fluid was delivered to the mother for delivery to the laboratory.

Finally, the research units in both groups completed the above questionnaires again after amniocentesis. SPSS software version 16 (IBM, SPSS Inc., Chicago, Illinois, USA) was used for statistical analysis of data. First, the normality of quantitative variables was determined by Kolmogorov–Smirnov test. Parametric methods were used for variables that had normal distribution while equivalent nonparametric methods were used for variables that did not have normal distribution. Frequency distribution tables, mean statistical indices, and standard deviation were used to describe the characteristics of the research unit and data. *T*-test and repeated-measure test were used to achieve the research objectives. In the tests performed, a confidence interval of 95% and a significance level of  $\alpha < 0.05$  were considered.

## Results

The age range of the participants in the present study was 17–44 years, with a mean of  $33.5 \pm 5.67$  years. The number of pregnancies in women was between 0 and 4 pregnancies, with an average gestational age of 14–20 weeks [Table 1].

The results of the data showed that the highest mean is related to the intervention group but in the later stages of the research has decreased significantly. The highest minimum scores in all stages were related to the intervention group [Table 2].

The results of Mann–Whitney intergroup test showed that the scores of the two groups before the intervention were not significantly different ( $P < 0.01$ ); however, after the intervention, the scores of the two groups were significantly different ( $P < 0.001$ ). However, after amniocentesis, there was no significant difference between the intervention and control groups ( $P < 0.023$ ). Further, the results of the study of perceived stress data by Wilcoxon intragroup test showed that the intragroup

**Table 1: Demographic characteristics of research units**

Variable	Mean±SD	
	Intervention	Control
Mother's age	32.9±5.85	34±5.5
Gestational age (weeks)	16.35±0.93	16.5±1.08
Number of deliveries	1.3±0.85	1.6±1.25

SD=Standard deviation

**Table 2: Mean, standard deviation, minimum and maximum scores of perceived stress in three stages of study in research units**

Perceived stress variable	Mean±SD	Minimum	Maximum
Perceived stress before training			
Intervention group	30.1750±6.53153	19.00	47.00
Control group	28.2750±8.57841	9.00	63.00
Perceived stress after training			
Intervention group	19.9500±4.78754	10.00	29.00
Control group	24.9500±5.42052	9.00	36.00
Perceived stress after amniocentesis			
Intervention group	21.7250±4.60205	13.00	33.00
Control group	23.9000±5.66048	9.00	34.00

SD=Standard deviation

changes of the intervention and control groups were significant ( $P < 0.001$ ) [Table 3].

## Discussion

The aim of this study was to investigate the effect of education on the perceived stress of amniocentesis candidate mothers, which was performed on 80 eligible pregnant mothers. According to the results of the study, the participants had a mean age of  $33.5 \pm 5.67$  years. The mean age of eligible women in this study was similar to other studies, including Tara<sup>[4]</sup>. The level of mothers' stress before the intervention in the present study was high so that the highest level of perceived stress was related to the intervention group. For many women, pregnancy is a stressful period and requires some kind of psychological adjustment to ensure the health of the mother and fetus.<sup>[21,22]</sup> The increasing need for invasive procedures in pregnancy and its consequences to diagnose fetal abnormalities before birth as a critical emotional event is stressful for women.<sup>[5,23]</sup> If coping with stressful situations does not work well, negative emotions and even irreversible psychological problems develop.<sup>[15]</sup> In the study of Azh *et al.*, the results showed that the most common cause of increased preterm delivery in mothers is the experience of stress caused by fetal screening.<sup>[24]</sup> Various studies have shown that most pregnant women who are referred for amniocentesis experience high levels of stress. Most studies that have examined the causes of stress have mentioned that the two causes of lack of awareness and confusion of parents



**Table 3: Evaluation of the effect of education on the perceived stress of pregnant women candidates for amniocentesis in the control and intervention group**

Perceived stress	Group, mean±SD		Mann-Whitney (P)
	Intervention group	Control group	
Perceived stress before training	30.1750±6.53153	28.2750±8.57841	0.018
Perceived stress after training	19.9500±4.78754	24.9500±5.42052	0.001
Perceived stress after amniocentesis	21.7250±4.60205	23.9000±5.66048	0.023
Wilcoxon (P)	0.001	0.001	

SD=Standard deviation

are the most important causes of perceived high levels of stress.<sup>[5,25,26]</sup> The results of various studies show that parents do not have proper information and knowledge about the benefits, harms, and risks in relation to various diagnostic methods of fetal health.<sup>[27,28]</sup> Therefore, in the present study, after the educational intervention related to amniocentesis and with the aim of increasing the awareness of pregnant mothers, the results showed a significant difference in the mean score of perceived stress in the intervention group before and after training. In fact, education can reduce stress before amniocentesis in pregnant women. The study of Alipour *et al.* also showed that training on how to deal with perceived stress during pregnancy can reduce perceived stress during pregnancy by increasing self-efficacy in pregnant women.<sup>[29]</sup> Further, the study of Hallajan *et al.* confirmed the effect of education during pregnancy on reducing perceived stress in pregnant women.<sup>[30]</sup> The mean score of perceived stress in the intervention group before and immediately after amniocentesis was also different. This suggests that intervention before amniocentesis reduces postamniocentesis stress in pregnant mothers. These results indicate the effectiveness and durability of the training effect. In this regard, the results of studies by Esfehiani also showed the positive effect of education on stress reduction.<sup>[31]</sup> In addition, the mean score of perceived stress in the intervention and control groups after the intervention and immediately after amniocentesis was different. In the pretraining stage, the level of stress was not different between the two groups and was at a high level; however, in the posttraining period and after amniocentesis, the intervention group was lower than the control group. It seems that understanding pain, worry, and expectation of test results and demographic variables should be considered. Abbasalizadeh *et al.*'s study also showed that the amount of stress and anxiety in women after amniocentesis was higher than before amniocentesis. They also attributed to the cause of this high stress to lack of knowledge of the method and fear of harm to themselves and the fetus.<sup>[32]</sup> The results of the study by Tursinawati *et al.* showed that the perceived awareness and risk of having an abnormal baby did not have serious psychological effects on women.<sup>[33]</sup> Abbasalizadeh *et al.* reported in their study that depression and anxiety significantly increase after amniocentesis, which can lead to complications such as spontaneous abortions,

so they emphasize the role and place of education and counseling before amniocentesis.<sup>[32]</sup> Perceived stress depends on a person's perception of what is happening around them. In one way, one person may perceive an event as stressful and threatening, while the other person perceives the same event as stress-free.<sup>[33]</sup> Therefore, stress and tension follow the requests and the feeling of threat or stress perceived by people. As a result, the type of response to stress or threat varies depending on the requests and perceptions of individuals.<sup>[34]</sup> The supportive needs of women seeking positive prenatal screening results indicate that basic needs for knowledge and information, decision-making assistance, and emotional support remain unanswered, requiring face-to-face interaction, training, and consultation with relevant professionals.<sup>[35]</sup> Women's psychological response to aggressive methods of prenatal diagnosis can be affected by knowledge and understanding of their infant risk.<sup>[36]</sup> The information that women gain when performing an amniocentesis test and understanding the risks associated with amniocentesis (for example, the risk of miscarriage or chromosomal abnormalities) is complex and specialized and can lead to severe stress and anxiety if it is not structured and consistent with goals.<sup>[37]</sup> Therefore, training to deal with stressful situations includes very strong and effective techniques and can be used when dealing with stressful events.<sup>[38-40]</sup>

## Conclusion

Given that amniocentesis is an invasive procedure that increases perceived stress and anxiety of mothers who are candidates for this method, its psychological aspects should be considered. Interventions should also be considered that not only provide comprehensive information but also improve emotional problems and decision making. Therefore, considering that the effect of training sessions before amniocentesis was shown in the present study, it is recommended to develop comprehensive support programs that include training using effective strategies and psychological support before amniocentesis and follow-up care.

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### Conflicts of interest

There are no conflicts of interest.

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