

The Effect of Education on Perceived Stress and Anxiety in High Risk Pregnant Women Awaiting for Amniocentesis: a Quasi-experimental Study

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ARTICLE INFO	ABSTRACT
<p><i>Article type:</i> Original article</p>	<p>Background & aim: Amniocentesis is the most common invasive method used for diagnosis of genetic disorders. Studies showed that women with insufficient information about amniocentesis have high level of anxiety. The present study was performed to evaluate the impact of education on perceived stress of women referring for amniocentesis.</p>
<p><i>Article History:</i> Received: 19-Apr-2022 Accepted: 26-Dec-2022</p>	<p>Methods: This quasi-experimental study was conducted on 62 pregnant women referring to Alzahra hospital, Tabriz, Iran for amniocentesis from March 2019 to January 2020. Using block randomization, the subjects were assigned to two groups of 31 women for each group. The intervention group received an oral and face-to-face individual training session. Perceived Stress Scale and Spielberger State-Trait Anxiety Inventory were completed before and 2 to 3 weeks after amniocentesis (before receiving results). ANCOVA and repeated measures ANOVA were used for data analysis.</p>
<p><i>Key words:</i> Anxiety Stress Amniocentesis Education</p>	<p>Results: The mean score of perceived stress before, after the intervention and 2 to 3 weeks after amniocentesis was 25.25±7.49, 23.87±7.40 and 24.45±7.09, respectively. The mean score of state anxiety were 43.84±10.03, 42.35±11.13 and 41.67±11.24, and trait anxiety were 42.53±10.56, 39.19±9.35 and 41.29±10.40, respectively. After the intervention, with adjusting the baseline scores, significant difference was found between two groups regarding stress (P=0.020), state anxiety (P=0.029) and trait anxiety (P=0.002), but 2 to 3 weeks after amniocentesis, no difference was observed in terms of perceived stress (P =0.198), state anxiety (P =0.394) and trait anxiety (P =0.516).</p> <p>Conclusion: Positive short-term effect of education was seen on perceived stress and anxiety of women referring for amniocentesis. It is recommended to perform more trials to assess its long-term effects.</p>

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Introduction

Pregnancy and transmission to parenthood involve extensive mental, psychological, biological, and social alterations (1), which are highly associated with increased anxiety, worry, and symptoms of depression (2). Prenatal diagnosis of fetal abnormalities is an extremely emotional and stressful event for pregnant women. They feel anxiety about fetal abnormalities and screening tests (3). The

anxiety increases with inadequate support from family members or medical team, and if exacerbated, leads to clinical anxiety during pregnancy or postpartum depression (4).

Anxiety is characterized as a diffuse, unpleasant, and vague inner turmoil, often accompanied by symptoms such as tiredness, restlessness, palpitations, and dizziness. Anxiety is caused by the recurrence of stressful

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situations harmed the person (5). "Stress describes experiences that are emotionally and physiologically challenging." Factors contributing to stress may be acute (e.g., hassles) or chronic (e.g., bereavement), small in magnitude (e.g., standing in a long line), or traumatic (e.g., violent attack) (6) and also a reaction to external pressures or unfavorable conditions (7). Women awaiting amniocentesis had high level of stress and anxiety (8).

Amniocentesis is one of the most common invasive methods to diagnose prenatal genetic disorders (3). It is usually performed in cases of advanced maternal age, abnormal ultrasound findings, or a history of chromosomal abnormalities. In amniocentesis, a sample of amniotic fluid is taken from the uterus, usually at 15-16 gestational weeks (9). Fetal health is the most common concern of the mother (9, 10).

Pregnant women awaiting amniocentesis often feel anxious over this procedure, as it is harmful to their health and that of the fetus while fearing the possibility of adverse outcomes. The psychological impact of amniocentesis is of paramount importance, but it has garnered less academic interest (7). Some researchers have reported high levels of anxiety among mothers awaiting amniocentesis (11-12). Numerous studies indicate that pregnant women with inadequate information about prenatal diagnostic tests have higher anxiety scores than those who have enough information (2, 7-8, 13).

Education provides information for the acquisition of new skills or changes attitude (14). Patient's education is defined as a planned learning experience that employs a combination of methods such as training, counseling, and behavior correction to influence the patient's knowledge and health behavior. It is a process that assists patients to actively participate in their health care and acquire information about health services (15). Providing information to patients through education before conducting the procedure is effective on reduction of stress and anxiety (16). According to the ISUOG (International Society of Ultrasound in Obstetrics and Gynecology), "Practice Guidelines: invasive procedures for prenatal diagnosis", before performing any invasive procedure, the consultation by a gynecologist, geneticist, or midwife about the benefits, risks,

and techniques of the procedure should be provided (17).

Recommending amniocentesis to patients and receiving test results is usually associated with emotional and decision-related challenges (including increased stress, anxiety, and emotional arousal). The field surveys report that the patients referring to the medical center for amniocentesis don't receive information for informed decision making and emotional support (18). Whereas, the principle of informed participation in medical procedures is often assumed as a pivotal component of modern health care (19). Few studies in other countries evaluated the effect of counseling on anxiety of women undergoing amniocentesis (20-23). According to our knowledge, only one study in Iran evaluated the effect of education on anxiety of pregnant mothers awaiting amniocentesis (19). However, stress has not been assessed in any of the studies. Therefore, the current study was performed to examine the impact of education on perceived stress and anxiety of high-risk pregnant mothers referring for amniocentesis.

Materials and Methods

This quasi-experimental study was conducted on 62 pregnant women referred for amniocentesis to the Department of Maternal and Fetal Medicine of Alzahra Hospital in Tabriz, Iran with code of the ethics committee (IR.TBZMED.REC.1398.983).

The purposive sampling started in March 2019 and ended in January 2020 in Al-Zahra Hospital (Figure 1). The sample size was determined as 28 individuals using G-power software [Method: Difference between two independent means of two groups]. The findings of the study by Mojahed and colleagues (19) were applied for both state and trait anxiety. For the state anxiety, considering $m_1=34.72$ (mean score of state anxiety in the intervention group), $m_2=41.32$ (mean score of state anxiety in the control group), $sd_1=7.96$; $sd_2=10.56$, One-sided $\alpha=0.05$, and Power=80%, the sample size was determined as 26 subjects. For the trait anxiety, considering $m_1=41.70$ (mean score of trait anxiety in the intervention group), $m_2=49.92$ (mean score of trait anxiety in the control group), $sd_1=10.10$; $sd_2=9.41$, One-sided $\alpha=0.05$, and Power=80%, the sample size was

determined as 19 subjects. Since the sample size was determined to be higher for the variable of state anxiety, and considering the 20% probability of sample loss, the final sample size was determined as 31 for each group, and to a total of 62 people were included in the study.

The inclusion criteria were: pregnant women candidates for amniocentesis, singleton pregnancy, gestational age 11 to 14 weeks (based on ultrasound of the first trimester of pregnancy), a secondary school education and higher, and providing written informed consent. The exclusion criteria were: a history of the physical-mental disorder and hospitalization in a mental hospital, a history of any past psychotherapy based on self-report, taking any psychiatric drugs based on self-report, marital problems based on self-report, attending in classes for relaxation, meditation, and yoga, among others, experiencing trauma in the last 6 months, and very high level of anxiety (score ≥ 60 on the Spielberger State-Trait Anxiety Inventory (STAI) (24).

The researcher evaluated pregnant mothers with 11-14 weeks of gestation who had an appointment for amniocentesis, and if they were eligible in terms of inclusion criteria, explanations about the objectives and method of the study, as well as the optional participation in the study and the confidentiality of research information were provided. The subjects who were willing to cooperate in the study signed an informed consent. The socio-demographic and obstetrics questionnaire, Perceived Stress Scale (PSS) and the Spielberger State Trait anxiety Inventory (STAI) were completed by the participants before the intervention and those who scored ≥ 60 on the STAI were excluded from the study. They were referred to the psychiatrist for consulting or appropriate treatment due to intense level of stress. Those who scored less than 60 were included in the study.

The subjects were assigned to two groups (intervention and control) by random blocking method with block sizes of 4 and 6 and an allocation ratio of 1:1. For allocation concealment, the intervention type was written on a piece of paper and put inside the opaque and numbered envelopes. After selecting the sample and obtaining informed consent, the envelopes were opened by the researcher in

order of the appearance, and the group of individuals was determined. Randomization and preparation of the envelopes were done by a person who was non-involved in the sampling process. The socio-demographic and obstetrics questionnaire had two parts: (A) Socio-demographic data which consisted of age, level of education, occupation, place of residence, and adequacy of monthly income for living expenses, and (B) Obstetrics characteristics which consisted of gestational age, number of pregnancies and deliveries, history of miscarriage, history of fetal or neonatal abnormalities in previous pregnancies, and reason for amniocentesis. The PSS assesses the thoughts and feelings of individuals over the past month. The questionnaire has 14 items which are scored on a 5-point Likert scale: never (0), rarely (1), sometimes (2), often (3), and almost always (4). The lowest attainable score is zero and the highest score is 56. The reliability of the Persian version of the PSS was calculated by Bastani et al. using internal consistency, and Cronbach's alpha was 0.81 (25).

The STAI was developed by Spielberger in 1996 as a standard self-assessment tool with high scientific validity (26). It consists of two subscales for measuring state and trait anxiety. It includes 40 items, 20 items for each subscale. It is scored on a 4-level Likert scale, ranging from 1-4 (1: never, 2: somewhat, 3: moderate, and 4: very high). The STAI is one of the most widely used standard tools in global research to measure anxiety which has been translated into various languages (27). Mahram (1993) standardized this questionnaire in Iran, the reliability of which was calculated to be 0.91 using Cronbach's alpha (24). This inventory has been used in several studies in Iranian pregnant women and its reliability has been confirmed (27-30).

The validity of the socio-demographic and obstetric characteristics questionnaire in this study was determined by content and face validity. Reliability of STAI and PSS was determined by performing a test on 20 people, calculating internal consistency (i.e., Cronbach's alpha coefficient) and then re-test on the same 20 people with an interval of two weeks, and calculating the intra class correlation coefficient (ICC). Cronbach's alpha and ICC were 0.912 and

0.784 for state anxiety, 0.894 and 0.773 for trait anxiety, and 0.811 and 0.657 for perceived stress, respectively.

For the participants of the intervention group in the 11th to 14th week of pregnancy, an individual training session was held by the trained expertise midwife (First author). The researcher held the training session as orally and face to face with questions and answers in a conference room, and discussed about the procedure, reasons, and benefits of amniocentesis and its possible complications, stress and anxiety and ways to cope with them. A training booklet (Table1) was provided to the participants after the session. Moreover, after training session, the researcher answered the mothers' questions and then their feedbacks was asked.

Table 1. Training Booklet content

List of titles of training Booklet
Necessity of consulting with a gynecologist or midwife before doing amniocentesis
Definition of amniocentesis
Candidate pregnant women for amniocentesis
The best time to perform amniocentesis
Doing amniocentesis under ultrasound guidance
Feeling pain during amniocentesis
Risks and side effects of amniocentesis
Other types of laboratory tests
The certainty of test results
Options in case of abnormal results
Necessary measures and recommendations after amniocentesis
Definition of stress and stress control methods during pregnancy
Definition of anxiety
Anxiety during pregnancy
Adverse consequences of anxiety during pregnancy on fetus and newborn
Methods of reducing anxiety & anxiety treatment

One week after training, phone calls were made to the participants ensuring that they have studied the training booklet. Then, when mothers referred for amniocentesis at the scheduled time, the PSS and STAI were completed post-test once before amniocentesis at 16 weeks of gestation and again 2 to 3 weeks after the procedure. The control group completed the PSS and the STAI once before amniocentesis and again 2 to 3 weeks after amniocentesis before receiving the result.

The tools used for data collection in the current study were: Socio-demographic and obstetrics data questionnaire, the PSS and the STAI.

The socio-demographic and obstetrics questionnaire had two parts: (A) Socio-demographic data which consisted of age, level of education, occupation, place of residence, and adequacy of monthly income for living expenses, and (B) Obstetrics characteristics which consisted of gestational age, number of pregnancies and deliveries, history of miscarriage, history of fetal or neonatal abnormalities in previous pregnancies, and reason for amniocentesis. The PSS assesses the thoughts and feelings of individuals over the past month. The questionnaire has 14 items which are scored on a 5-point Likert scale: never (0), rarely (1), sometimes (2), often (3), and almost always (4). The lowest attainable score is zero and the highest score is 56. The reliability of the Persian version of the PSS was calculated by Bastani et al. using internal consistency, and Cronbach's alpha was 0.81 (25). The STAI was developed by Spielberger in 1996 as a standard self-assessment tool with high scientific validity (26). It consists of two subscales for measuring state and trait anxiety. It includes 40 items, 20 items for each subscale. It is scored on a 4-level Likert scale, ranging from 1-4 (1: never, 2: somewhat, 3: moderate, and 4: very high). The STAI is one of the most widely used standard tools in global research to measure anxiety which has been translated into various languages (26). Mahram (1993) standardized this questionnaire in Iran, the reliability of which was calculated to be 0.91 using Cronbach's alpha (24). This inventory has been used in several studies in Iranian pregnant women and its reliability has been confirmed (27-30).

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anxiety, and 0.811 and 0.657 for perceived stress, respectively.

Data analysis was done by SPSS software (version 24). Kolmogorov-Smirnov test was applied to assess the normality of quantitative data, which revealed that all data had a normal distribution. Independent t-test, chi-square, Fisher's exact test, and chi-square for trend were employed to compare socio-demographic

and obstetrics characteristics among the two groups. Independent t-test was used to compare perceived stress and anxiety before the intervention and ANCOVA test was used after the intervention with control of baseline values. ANOVA with repeated measures was used for intra-group comparison. All analyzes were performed on an intention-to-treat basis. $P < 0.05$ was considered statistically significant.

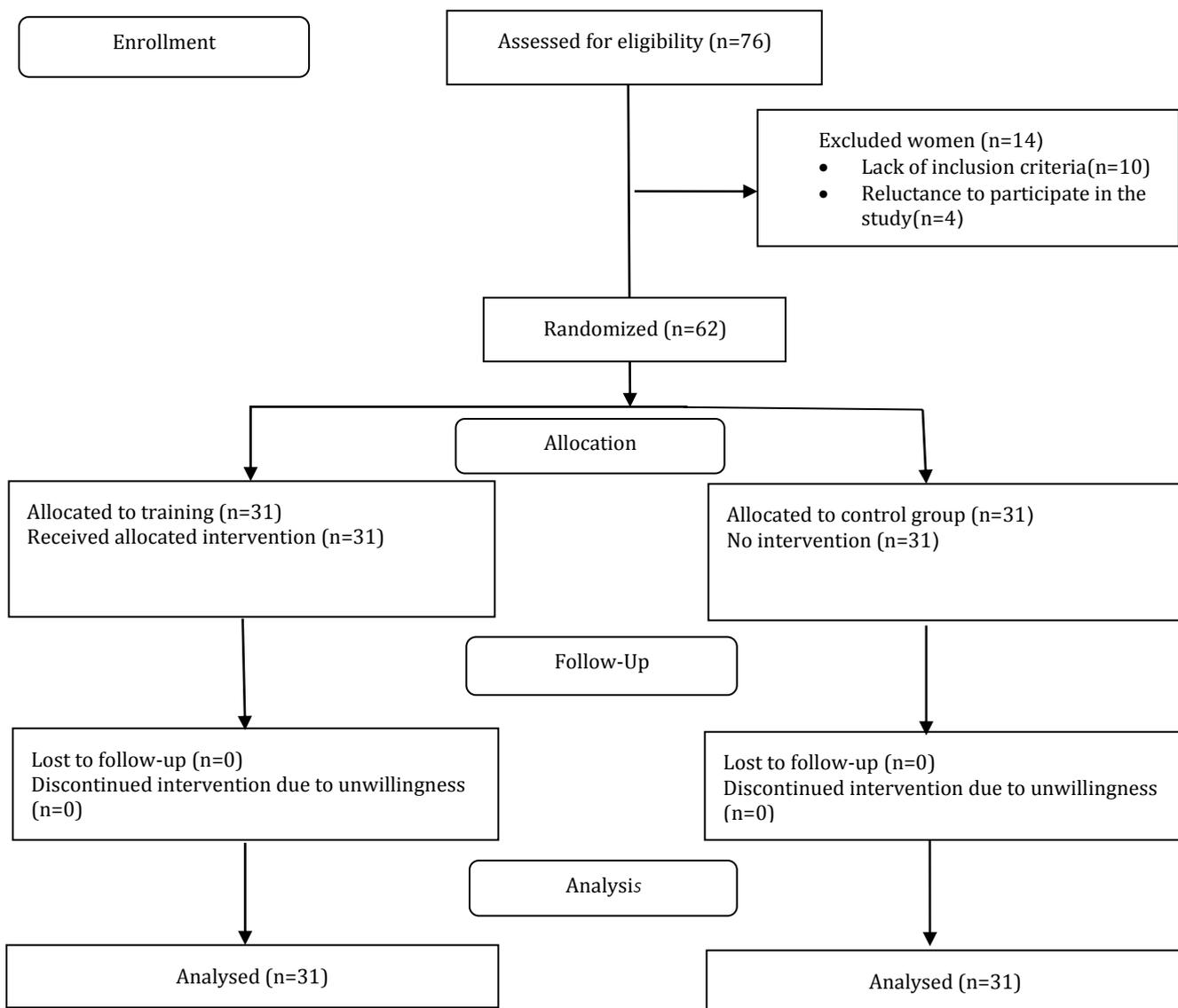


Figure 1. The CONSORT flow diagram of intervention in the two groups

Results

The two groups were significantly different in terms of socio-demographic and obstetric characteristics (Tables 2 and 3).

Before the intervention, no statistically significant difference was found between the two groups in terms of stress (P=0.916).

Table 2. Demographic characteristics of participants in the intervention and control groups

Variable	Intervention group N (%) N=31	Control group N (%) N=31	P-Value
Age (years) *	34.81±5.13	34.57±7.11	0.876†
Duration of marriage (years) *	11.66±6.77	9.70±6.75	0.260†
Family relationship with spouse			0.830¥
Yes	6 (18.8)	5 (16.7)	
No	26 (81.3)	25 (83.3)	
Education level			0.112‡
Secondary	3 (9.4)	7 (23.3)	
High school	2 (6.3)	3 (10.0)	
Diploma	14 (43.8)	11 (36.7)	
University	13 (40.6)	9 (30.0)	
Job			0.703§
housewife	29 (90.6)	26 (86.7)	
Employed	3 (9.4)	4 (13.3)	
Spouse's education level			0.228‡
Primary	3 (9.4)	5 (16.7)	
Secondary	7 (21.9)	8 (26.7)	
High school	1 (3.1)	1 (3.3)	
Diploma	8 (25.0)	8 (26.7)	
University	13 (40.6)	8 (26.7)	
Spouse's job			0.830§
Employee	7 (21.9)	5 (16.7)	
Worker	7 (21.9)	9 (30.0)	
Shopkeeper	3 (9.4)	4 (13.3)	
Other	15 (46.9)	12 (40.0)	
Adequacy of family income			0.087‡
Enough	5 (15.6)	9 (30.0)	
Fairly enough	17 (53.1)	18 (60.0)	
Inadequate	10 (31.3)	3 (10.0)	
Residence			0.618¥
Personal	15 (46.9)	15 (50.0)	
Rent	9 (28.1)	6 (20.0)	
Spouse parents' home	7 (21.9)	9 (30.0)	
Other	1 (3.1)	0 (0.0)	
Support level received from the spouse			0.519‡
Very low	0 (0.0)	3 (10.0)	
Low	7 (21.9)	5 (16.7)	
Much	10 (31.3)	8 (26.7)	
Very much	15 (46.9)	14 (46.7)	
Support level received from other members of family			0.547‡
Very low	5 (15.6)	7 (23.3)	
Low	4 (12.5)	1 (3.3)	
Much	10 (31.3)	13 (43.3)	
Very much	13 (40.6)	9 (30.0)	

‡ Chi-square for trend test; § Fisher's exact test; ¥ Chi-square test; † Independent t-test

Variables were reported as a number (percentage) except for * cases reported as a mean± standard deviation.

After the intervention (before amniocentesis), statistically significant difference was observed between the two groups in terms of stress based on ANCOVA test with adjusting the pre-

intervention score (Adjusted Mean Difference (AMD): -3.28; 95%Confidence Interval (95%CI): -6.03 to -0.53; P=0.020).

Table 3. Obstetrics characteristics of participants in the intervention and control groups

Variable	Intervention group	Control group	P-Value
	N (%) N=31	N (%) N=31	
Number of pregnancies			0.306¥
First pregnancy	4 (12.5)	7 (23.3)	
Second pregnancy	6 (18.8)	8 (26.7)	
Third pregnancy and above	22 (68.8)	15 (50.0)	
Number of deliveries			0.924¥
Zero	7 (21.9)	7 (23.3)	
One	15 (46.9)	15 (50.0)	
Two and above	10 (31.3)	8 (26.7)	
Number of live children			0.871¥
Zero	7 (21.9)	7 (23.3)	
One	18 (56.3)	15 (50.0)	
Two and above	7 (21.9)	8 (26.7)	
Number of abortions			0.056¥
Zero	13 (40.6)	21 (70.0)	
One	13 (40.6)	5 (16.7)	
Two and more	6 (18.8)	4 (13.3)	
History of stillbirth			0.492§
Yes	2 (6.3)	0 (0.0)	
No	30 (93.8)	30 (100)	
History of intrauterine death			1.00§
Yes	1 (3.1)	0 (0.0)	
No	31 (96.9)	30 (100)	
History of previous abnormalities			0.071¥
Yes	9 (28.1)	3 (10.0)	
No	23 (71.9)	27 (90.0)	
History of abnormalities in relatives			0.467¥
Yes	3 (9.4)	5 (16.7)	
No	29 (90.6)	25 (83.3)	
History of infertility			0.333¥
Yes	3 (9.4)	1 (3.3)	
No	29 (90.6)	29 (96.7)	
Use of assisted reproductive techniques			1.00§
Yes	3 (9.4)	2 (6.7)	
No	29 (90.6)	28 (93.3)	
Maternal desire for pregnancy			0.312¥
Yes	25 (78.1)	20 (66.7)	
No	7 (21.9)	10 (33.3)	
Spouse desire for pregnancy			0.465¥
Yes	25 (78.1)	21 (70.0)	
No	7 (21.9)	9 (30.0)	
History of previous amniocentesis			0.672§
Yes	4 (12.5)	2 (6.7)	
No	28 (87.5)	28 (93.3)	
Cause of previous amniocentesis			1.00§
Positive screening	2 (50.0)	2 (100.0)	
High NT	1 (25.0)	0 (0.0)	

Variable	Intervention group	Control group	P-Value
	N (%) N=31	N (%) N=31	
History of abnormalities	1 (25.0)	0 (0.0)	0.467§
Amniocentesis result			
Normal	2 (50.0)	0 (0.0)	
Abnormal	2 (50.0)	2 (100.0)	

§ Fisher's exact test ¥ Chi-square test

However, after amniocentesis (before receiving the results), no statistically significant difference was found between the two groups in terms of stress (AMD: -2.37; 95%CI: -6.02 to 1.28;

P=0.198). Also, based on the repeated measures ANOVA, the effects of time (P=0.791) and time*group (P=0.101) were not statistically significant (Table 4).

Table 4. Comparison of mean perceived stress scores in the intervention and control groups

Variable	Intervention		Control		Inter-group comparison‡ MD (95% CI)†, P	Results of repeated measures ANOVA	
	n	Mean±SD*	n	Mean±SD*		Time*group effect P-Value	Time effect P-Value
Perceived Stress (Score range: 0-56)						0.101	0.791
Before intervention	31	25.25±7.49	30	25.06±6.08	0.18 (-3.29 to -3.66); 0.916		
After intervention (before amniocentesis)	31	23.87±7.40	28	26.80±7.05	-3.28 (-6.03 to -0.53); 0.020		
After amniocentesis (before receiving results)	31	24.45±7.09	25	26.44 ±8.25	-2.37 (-6.02 to 1.28); 0.198		

*Standard Deviation; † Mean difference (95% Confidence Interval)

‡ Independent t-test was used to compare the groups before the intervention and ANCOVA was used after the intervention with adjusting the baseline value.

A lower score of perceived stress indicates better status.

Before the intervention, no statistically significant difference was seen between the two groups in terms of state anxiety (P=0.644). After the intervention (before amniocentesis), statistically significant difference was found between the two groups in terms of state anxiety based on ANCOVA test with adjusting the pre-intervention score (AMD: -4.34; 95%CI: -8.20 to -0.47; P=0.029). However, after amniocentesis (before receiving the results), no statistically significant difference was observed between the two groups in terms of state anxiety (AMD: -1.95; 95%CI: -6.50 to 2.60; P=0.394). Also, based on the repeated measures ANOVA, the effects of time (P=0.308) and time

group (P=0.212) were not statistically significant (Table 5).

Before the intervention, there was no statistically significant difference between the two groups in terms of trait anxiety (P=0.711). After the intervention (before amniocentesis), statistically significant difference was found between the two groups in terms of trait anxiety based on ANCOVA test with adjusting the pre-intervention score (AMD: -4.94; 95%CI: -8.00 to -1.88; P=0.002). However, after amniocentesis (before receiving the results), no statistically significant difference was found between the two groups in terms of trait anxiety (AMD: -1.18; 95%CI: -4.80 to 2.44; P=0.516). Also, based on the repeated measures ANOVA, the effect of time

($P=0.963$) was not statistically significant but the effect of time*group ($P=0.016$) was statistically significant (Table 5).

Table 5. Comparison of the mean scores of state anxiety in the two groups of intervention and control

Variable	Intervention		Control		Inter-group comparison‡ MD (95% CI)†, P	Results of repeated measures ANOVA	
	N	Mean±SD*	N	Mean±SD*		Time*group effect P-value	Time effect P-value
State anxiety (Score range: 20-80)						0.212	0.308
Before intervention	31	43.84±10.03	30	45.00±9.54	-6.13) ; 0.644 -1.15 (to 3.82		
After intervention (before amniocentesis)	31	42.35±11.13	28	46.32±11.73	-4.34 (-8.20 to - 0.47); 0.029		
After amniocentesis (before receiving results)	31	41.67±11.24	25	43.72±12.33	-1.95 (-6.50 to 2.60); 0.394		
trait anxiety (Score range: 20-80)						0.016	0.963
Before intervention	31	42.53±10.56	30	43.40±7.63	0.87 (-5.53 to 3.80); 0.711		
After intervention (before amniocentesis)	31	39.19±9.35	28	44.12±9.44	-4.94 (-8.00 to - 1.88); 0.002		
After amniocentesis (before receiving results)	31	41.29±10.40	25	42.88±9.25	-1.18 (-4.80 to 2.44); 0.516		

*Standard Deviation; † Mean difference (95% Confidence Interval)

‡ Independent t-test was used to compare the groups before the intervention and ANCOVA was used after the intervention with adjusting the baseline value.

A lower score of perceived stress indicates better status.

Discussion

The findings of the present study showed that oral and written education in the form of an educational booklet led to statistically significant reduction of perceived stress and anxiety in the intervention group after the intervention (before amniocentesis) compared to the control group, but 2 to 3 weeks after performing amniocentesis, no significant difference was found between the two groups. In other words, pregnant mothers' anxiety will be reduced by increasing their awareness of the intervention process and related matters. However, several factors including economic, social and cultural factors can justify higher levels of stress and anxiety after amniocentesis.

Also, the time limit for performing legal abortions in our country, which is up to 19 weeks, and the subsequent process of obtaining permission for legal abortion from the competent authorities, followed by the costs associated with the abortion cause additional stress for pregnant women. Furthermore, the relatively high level of anxiety experienced by pregnant women, especially concerning infant-related factors, may hinder their perceive and use of the information at this period until they receive results (20). The results of a study confirmed the effectiveness of COVID-19 selfcare training via telemedicine in reducing the perceived stress and anxiety of pregnant women during the coronavirus pandemic. Therefore, the use of this method in the care of

pregnant women is recommended to mitigate stress and anxiety (21). The results of the study indicated that prevalence of perceived stress among pregnant women during the COVID-19 pandemic period in Northwest Ethiopia was relatively high. This study recommends that all pregnant people should be screened and treated for perceived stress particularly during pregnancy. Emphasis should be given to early detection and treatment of antenatal anxiety and depression. Pregnant students must be strongly evaluated and intervened for perceived stress (23). Psychological distress during the waiting period can be characterized as an uncertainty about fetus safety and test results.

In a prospective study conducted at Melbourne Victoria Hospital in Australia, all eligible pregnant women with a gestational age of 8 to 14 weeks were assessed through structured self-report questionnaires. The results indicated that short-term anxiety in mothers with sufficient information was not significantly different from those with little to no information (24).

The study conducted in the perinatology department of the Obstetrics and Gynecology Polyclinic of Maram Medical School on pregnant women with a gestational age of 16 to 20 weeks referred for amniocentesis revealed that the counseling before amniocentesis was significantly effective on decreasing anxiety (22). The results of the mentioned study are consistent with the results of the present study. Both studies were performed in three stages: pre-intervention, post-intervention (pre-amniocentesis), and post-amniocentesis; the results showed that adequate counseling before amniocentesis effectively reduces the actual amount of anxiety in the mother. Therefore, routine education is recommended for pregnant women before amniocentesis.

The results of this study revealed that the anxiety score significantly decreased in the experimental group immediately after the intervention (23). In another study that aimed to investigate the effect of providing supportive information on anxiety levels of pregnant women waiting to receive amniocentesis results, participants were evaluated in two groups A (training) and group B (control). Anxiety levels of the participants were measured at four different time intervals: (1) after amniocentesis,

(2) before calling the patient to schedule for receiving the test result, (3) after the phone call and providing supportive information to the intervention group, and (4) Before receiving the results of amniocentesis. No significant difference was found between the two groups regarding trait anxiety scores. Also, after amniocentesis and before calling the patient to schedule for receiving the test result, state anxiety scores were not significantly different between the two groups. However, the state anxiety scores were significantly lower in group A than those in group B after receiving supportive information and before receiving the results (24). The results of the above studies are in accordance with the results of the current study. Amniocentesis is accompanied with high levels of anxiety in pregnancy women while waiting for the results. In another study conducted in Sweden, in addition to routine oral and written information, the women in the intervention group watched a 25-minute video on prenatal screening and diagnosis that included information about screening tests, second-trimester ultrasound, diagnosis of fetal abnormalities by Chorionic Villus Sampling (CVS), and amniocentesis. The findings showed no statistically significant difference between the two groups regarding state and trait anxiety (20). The results of the above studies are not consistent with those of the current study and the reason may be the difference in the type of the study and intervention and duration of the intervention. The study conducted at Australia was an observational study whereas the present study is an interventional study. Also, in the study conducted at Sweden, state and trait anxiety was examined only at 26 weeks of gestation, but in the current study, it was examined before intervention, then after intervention, and after amniocentesis. Also, the type of education was different in the present study (32).

In the research conducted in New Zealand, one group was assigned to voice message, the second group to video message and the third group to text message. The findings suggested that high-anxious individuals reported greater distress and lower coping efficacy in response to the video message compared to the audio message. They also reported more possibility of

miscarriage in response to the video message compared to the text message. Use of video, assumed to be most informative for educating patients, could induce higher distress about prenatal testing in individuals prone to stress & anxiety (33, 34). The findings of the above study are not consistent with the current study. In the research conducted in New Zealand, there was no control group and also the type of education and information presentation was different with the present study. Also, they only assessed trait anxiety, but in the present study, both state anxiety and trait anxiety were assessed (35).

In line with the findings of the current study, the results of the study conducted by Mojahed et al. (19) in Iran indicated positive effect of education on anxiety of pregnant women candidates for amniocentesis. Similar to the present study, the type of their study was quasi-experimental and also STAI has been used to measure state and trait anxiety, but the intervention group received only group training for 90 minutes immediately before amniocentesis.

One of the strength of this study was providing of training by experienced and trained midwife. Sample selection from only one public hospital was one of the limitations of this study. The short-term duration of intervention and follow-up was another limitation. Therefore, it is recommended to do research with a larger sample size in different cultures and societies. Also, it is suggested to perform further studies by different educational methods and more training sessions.

Conclusion

The results of the current study revealed that training had positive short-term effect on perceived stress, state anxiety and trait anxiety. However, conducting more trials is recommended to determine the long-term effects of training. The authors recommend that training brochures be distributed at prenatal care centers so that the women can read information freely without a time limit, and thus be ready to ask for more information from their midwife and physician. The authors also recommend that face-to-face education be provided by a trained midwife before performing amniocentesis in the hospital. Education provides appropriate basic

knowledge and information about amniocentesis or other invasive diagnostic procedures when referring to the hospital.

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Conflicts of interest

The authors declared no conflicts of interest.

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