

Comparing the Ratio of Anxiety and Depression in Women with Positive Aneuploidy Screening Result before and after Amniocentesis Result

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Abstract

Background: Anxiety disorders are one of the most common psychiatric disorders in pregnancy, and this issue can have a negative effect on the fetus. One of the factors intensifying anxiety and depression in pregnant women is diagnostic tests such as amniocentesis. This study has been conducted to investigate the anxiety and depression of women with positive screening result before and after amniocentesis. **Methodology:** The present study was a descriptive-correlation that was examined 283 amniocentesis candidate pregnant women referred to Al-Zahra Hospital in Tabriz in 2018. Samples were selected using a purpose-based sampling method and entered into the study according to include criteria. The data collection tool included an individual-social questionnaires, and anxiety and depression questionnaire. Questionnaires were completed before and after the result of amniocentesis by pregnant women, and then the collected data was analyzed using statistical paired t-test and SPSS software. **Findings:** The results showed that, the anxiety rate in of pregnant women before amniocentesis was 91.89 ± 11.52 and 99.68 ± 16.6 after the result of amniocentesis, which had statistically significant difference ($p < 0.05$). In addition, the results of the study showed that the rate of depression in pregnant women before amniocentesis was 26.23 ± 3.33 that after the result of amniocentesis reached 26.26 ± 3.43 , which did not have statistically significant difference ($p > 0.05$). **Discussion and Conclusion:** The findings showed that, positive results of aneuploidys screening tests, especially Down syndrome, increased anxiety and depression in pregnant women, which had negative effects on mother and fetus, and increased the probability of spontaneous abortion. Therefore, it is suggested that consultations have to take to reduce the anxiety and depression of amniocentesis candidate pregnant women before conducting the procedure through holding educational classes.

Key words: Aneuploidy, Amniocentesis, Anxiety, Depression, Pregnant Mothers.

Introduction

Pregnancy is a highly sensitive period for catching psychological problems (Schetter and Tanner, 2012), and anxiety disorders are one of the most common psychological disorders, which its rate in pregnancy has been reported from 4.4% to 39% (Austin et al., 2005). The anxiety in pregnancy may have negative effects on the fetus because the secreted hormones such as catecholamines as a result of stress in the mother, affect the brain development of fetus by passing through the placenta. Moreover, these hormones cause the placenta vessels contraction that reduces the oxygen supply and fetal feeding (Field et al., 2003). In addition, mother's anxiety causes preterm delivery, emotional problems, hyperactivity disorder symptoms, intrautena growth restriction, crying and restlessness and low mental development

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of the infant (Austin et al., 2005). Despite the anxiety, depression in women is also more common than men. In addition, pregnancy can

itself intensify the background of depression. Depression in the pregnancy involves both mother and child and sometimes the whole family, and has a harmful effect on mother and infant, and also on family relationships and child development (Figueiredo, Pacheco and Costa, 2007).

Prenatal diagnosis of fetal abnormalities has critical and stressful emotional event for women. Most pregnant women have anxiety about fetal abnormalities when they are suggested to do screening tests. Amniocentesis is one of the diagnostic methods of fetal abnormalities and is the most common invasive method used for the diagnosing of fetal chromosomal disorders, and is usually used for cases such as older mothers, abnormal serum screening, and abnormal findings in ultrasound or the chromosomal abnormalities in the family (Karimi et al., 2017).

One of the most common chromosomal abnormalities is aneuploidy. Aneuploidy is the cause of more than 50% of first trimester abortions and 20% of second trimester abortions and 6-8% of fetal death cases and near fetal death. These disorders have been identified in 4% of pregnancies, and among them, trisomy 21 includes more than half of the cases (Dashe et al., 2018). Down syndrome is a type of mental retardation that is created by an additional genetic substance in chromosome 21 (Green et al., 2004). This syndrome is the most common type of human chromosomal disease (Hu et al., 2017). Down syndrome is the most common cause of mental disability around the world, and affects about 1 out of 500 pregnancies, and is observed in 1 out of 800 up to 1 out of 1000 live birth (Gekas et al., 2016). Prenatal diagnosis of trisomy 21 is considered as the most common and important prenatal genetic test. The best performed screening tests can identify more than 90% of trisomy 21 cases with 50% false positive cases (Lim, Park and Ryu, 2013). Positive screening results need to be confirmed by diagnostic tests such as amniocentesis. At present, amniocentesis is only performed in high-risk pregnancies or in pregnancies with high maternal age or family history of a child with inherited disease and due to its invasive nature, it may cause intrauterine infection and abortion. Also, it requires experience for doing and it needs certain technical equipment (Alldred et al., 2017). Currently, the compound screening of first trimester and quadruple test in the second trimester of pregnancy is the most common serum-based screening test for Down syndrome (Dashe et al., 2018). In addition to the quadruple test, the double test with two free-BhCG and PAPP-A serum markers and sonographic nuchal thickness in the 11-13 weeks of pregnancy are also some of the screening tests (Alldred et al., 2017).

Screening tests, including double and quadruple tests and sonographic investigations for pregnant women are very simple and safe used for screening Down syndrome (Alldred et al., 2017; Khalili et al., 2012). Although non-invasive screening tests based on available biochemical and sonographic markers for the fetus with aneuploidy are safe in pregnancy, they have poor preciseness, and have a false negative rate between 12% and 23%, and a false positive rate between 1.9% and 5.2% (Norwitz and Levy, 2013).

Pregnant women who are candidates for amniocentesis are often afraid of this method, because they think that it is painful, and they are worried about the damages to the fetus and the probable undesirable outcomes. Therefore, women who candidate for diagnostic amniocentesis, experience acute mental disorders such as stress and anxiety (Leithner et al., 2004). Greene et al. conducted a systematic review study on the anxiety ratio of mothers with positive screening results for Down syndrome. The results of this systematic review showed that, anxiety in mothers with positive screening result significantly increases and after negative amniocentesis result, anxiety significantly declines (Green et al., 2004). Lou et al. in a systematic review study investigated 40 studies conducted between 2001 and 2013. In this study, the anxiety of mothers before and after amniocentesis was investigated in women with positive screening for Down syndrome. The results of this review study showed that before and after amniocentesis the anxiety ratio of mother has not had significant difference (Lou et al., 2015), which is contrasted with the results of most studies.

At present, aneuploidy screening tests, especially Down syndrome, are routine in prenatal cares. But, these tests and their positive results may cause anxiety and depression in pregnant women. As the various studies in this field have obtained contradictory results, this study has been designed and conducted aiming to investigate the anxiety and depression of women with positive screening results before and after the result amniocentesis.

Materials and Methods:

The present research was a descriptive-analytical study. In this study, the ratio of anxiety and depression has been investigated in women with positive screening results before amniocentesis and after receiving its results in pregnant women high-risk pregnancy clinic of Al-Zahra educational and therapeutic center in Tabriz. Pregnant women who had the inclusion criteria and the conditions to enter the study, who had indicated performing amniocentesis because of positive aneuploidy tests, were investigated. For each participant, individual and social characteristics` questionnaire, and anxiety and depression questionnaire were delivered, once before amniocentesis and once after receiving amniocentesis results and were completed as self-report. The sample size in this study using the Cochran formula and the anxiety prevalence of 10% and 0.4% accuracy was estimated 283 people. It should be mentioned that, it was considered to be $\alpha = 95\%$, and $\beta = 20\%$. Sampling was done using objective-based sampling method in a way that, all women with a positive screening result who had indication for amniocentesis were entered into the study, if they wished. The place of research in this study was the high risk pregnancy clinic of Al-Zahra educational therapeutic center in Tabriz in 2018.

The criteria to enter the study included pregnant women with positive screening test in first or second pregnancy. The exclusion criteria of the study also included pregnant mothers with any type of psychiatric disorder and the use of any psychological drug, mothers with drug and cigarette addiction, mothers with high-risk pregnancy that suffered from high stress and anxiety, such as mothers with diabetes, cancer, high blood pressure, kidney disease, epilepsy, multiple pregnancies, family or personal history of fetal birth defects and preterm birth.

The tools used in this study included 4 questionnaires. The first questionnaire included demographic characteristics such as age and education of the mother, age and education of the spouse, the occupation of wife and spouse, family income level, number of pregnancy and type of pregnancy (wanted or unwanted) and the estimated risk of aneuploidy. The second tool included the Spiel Berger's hidden and obvious anxiety questionnaire that specifically measured the severity of clinical anxiety symptoms in individuals. This questionnaire is a self-report questionnaire that has been prepared to measure the severity of anxiety in adolescents and adults. The questionnaire is a 21-item scale, in which the participant in each item chooses one out of four options that indicates the severity of anxiety. The four options of each question are scored based on the Likert's scale from zero to three. Each one of the test items describes one of the common symptoms of anxiety, including mental, physical, and fear symptoms. This questionnaire has high credit validity. Five types of content, concurrent, structure, diagnosis and factor validity have been assessed for this tool, all of which indicate the high efficiency of this tool in measuring the severity of anxiety. Also the alpha coefficient of 0.92 and its reliability coefficient by retesting method in one week interval has been reported about 0.75 internal correlation of its items from 0.30 to 0.76 (Behdani, Sargolzaei and Ghorbani ;2000 , Roohy et al., 2005; Kazemi Malek Mahmoudi, 2007).

The third tool included the PASS Prenatal Anxiety Screening Scale. This questionnaire has been designed and validated by Somerville et al. in 2013 for screening a wide range of anxiety symptoms that are observed especially in the prenatal period, and in various settings can be used such as pregnancy care clinics, and patients admitted to the hospital and psychiatric centers (Somerville et al., 2014). This questionnaire have 31 questions, with four structural factors: 1) acute anxiety and compatibility 2) general concern and special fears 3) perfectionism, control and trauma, and 4) social anxiety measuring mild and severe anxiety at the test sensitivity of 68 percent with the cutting point of 26 during the pregnancy period and one year after delivery in women aged 18 and over. This questionnaire has a significant correlation with depression, which is a useful tool for investigating the association of anxiety and depression highly emphasized in the studies. Each question has 4-option answers with a score of 0 to 3. For scoring, the scores of questions are aggregated and the score of 26 and above is the boundary between mild and severe anxiety. Asymptomatic is (0 to 20), mild anxiety is (41 to 21) and severe anxiety is (42 to 93). This questionnaire has been translated into Persian by Ranjbar et al. by forward-backward method in Iran, and then, by the retesting method. Its reliability has been determined about 80%. Also, its structural validity has been confirmed by factor analysis method (Ranjbar, 2016).

The fourth questionnaire included the Edinburgh Depression Screening Tool. The use of Edinburgh scale, which includes 10 questions, can reliably specify depression in women during pregnancy and postpartum period. The questionnaire is complete and reliable when all cases are being responded. During answering the questionnaire, the mother should answer the questions alone, and without the help of her acquaintances and associates. If the mother is not able to read the questions, she can use the other person to read and write the answers. "Edinburgh" Postpartum Depression Scale" can be used up to 6 weeks during the emergence of depression symptoms. The reliability of this questionnaire by making the two-half method has been reported equal to 0.93. In Iran, the obtained alpha coefficient for the assessment of internal consistency of this scale was about 0.78 and the coefficient of retest has also been obtained 0.86 (Ranjbar, Bakhshpour and Abriaghdam, 2009).

Finally, the collected data was analyzed using descriptive statistics (frequency, percentage) and (mean, standard deviation) and inferential statistics including paired t-test. Data analysis was performed using SPSS, version 22, software. This study was confirmed by the Ethics Committee of Tabriz University of Medical Sciences. Also informed consent was taken from all participants to participate in the study and they were assured about the confidentiality of the information. Code of Ethics:IR.TBZMED.REC.1397.1085.

Findings:

The results of present study showed that, the mean age of the participating mothers was 42.8 ± 1.3 and also most of them were not economically well-off. Table 1 shows the demographic characteristics of the participants.

Table 1. Frequency Distribution and Individual and Social Characteristics of Mothers Participating in the Study

Variable		Number (Percentage)	Variable		Number (Percentage)
Ethnicity	Turk	148 (97.4)	Monthly Income Ratio	Lower than Expenses	84 (52.5)
	Persian	4 (2.6)		Equal to Expenses	76 (47.5)
Residential Location	City	120 (78.9)		Higher than Expenses	0 (0)

	Village	32 (21.1)	Previous	Natural	56 (51.9)
Acid Folic Consumption	Yes	56 (28)	Delivery Type	Caesarean	52 (48.1)
	No	144 (72)		Standard Deviation $\pm$ Mean	
Number of Pregnancy	Standard Deviation $\pm$ Mean		Mother's Age	42.8 $\pm$ 1.3	
	2.4 $\pm$ 1.2		Spouse's Age	48.8 $\pm$ 2.1	

The study results also showed that, the ratio of anxiety of pregnant mothers before amniocentesis result was 91.89 ± 11.52 which after the amniocentesis result reached to 99.68 ± 16.6 , had statistically significant difference ($p < 0.05$). In addition, the study results showed that, the ratio of depression in pregnant mothers before amniocentesis result was 26.23 ± 3.33 that after amniocentesis result reached to 26.26 ± 3.43 , and it did not have statistically significant difference ($p > 0.05$). Table 2 shows the mean of positive amniocentesis result, and it was 48.61 ± 27.16 after the test result.

Table 2. Comparison of the Mean Scores of Anxiety and Depression in Mothers Participating in the Study

Variable	Before Amniocentesis	After Amniocentesis	Statistical Test (Paired T-Test)
Anxiety	91.89 ± 11.52	99.68 ± 16.60	$P = 0.001$
Depression	26.23 ± 3.33	26.26 ± 3.43	$P = 0.91$

Discussion and Conclusion

This study was conducted to compare the score of anxiety and depression in women with positive screening result before and after the amniocentesis result. The study results showed that, the ratio of anxiety before and after amniocentesis in pregnant mothers had statistically significant difference, meaning that after doing amniocentesis, anxiety had greatly increased. In this regard, the results of the studies showed that, the anxiety and stress of pregnant mothers were high before doing invasive diagnostic procedures such as amniocentesis, and also having positive result, it increased highly (Karimi et al., 2017; Lou et al., 2015; Lee et al., 2007). The results of the performed researches indicated that the level of anxiety has been reported relatively high in all cases, which can be due to the invasive nature of the method and unfamiliarity with it, which made pregnant mothers know the amniocentesis as an invasive operation towards their womb. In general, it can be concluded that, amniocentesis may be an anxiety maker and stressful factor (ASA, 2013) that was consistent with the results of the present study.

The study results of Karimi et al. in 2016 showed that, amniocentesis as an invasive diagnostic method, increased the perceived stress and anxiety of the mother's candidate for this method. Also, a significant relationship was observed between the perceived anxiety and stress of mothers (Karimi et al., 2016), which was consistent with the present study results. The study results of Shirazi et al in 2019 showed that, pregnant mothers of amniocentesis candidate tolerated a lot of anxiety before doing the procedure. Their findings showed that, there was a significant relationship between the ratio of anxiety and resistance to uterine artery flow. They concluded that, the anxiety resulting from the positive aneuploidy result could disrupt the blood flow of uterine artery and had negative effects on the fetus (Shirazi et al., 2019), which was consistent with the present study results. According to the results of the studies, the health of fetus was the main factor of mothers' concern (Mujezinovic and Alfirevic, 2007; Cunningham et al., 2014). The results of one study indicated that, women who were in the amniocentesis group, had experienced more anxiety than the control group (El-Hage et al., 2012), because this method was associated with risks such as trauma to fetus, membrane rupture, mother's infection, and maternal fetal hemorrhage and abortion (Baillie and Mason, 1997). Probably the lack of awareness of pregnant mothers has increased their anxiety and stress which was consistent with the results of the present study.

Evidences showed that, patients' awareness of procedures, can affect their anxiety ratio. The study results of Rabiei et al. showed that, awareness and knowledge of pregnant women about screening tests such as amniocentesis was low, which was influenced by various factors (Rabiei and Jouhari, Pirasteh, 2019). Therefore, this low awareness of pregnant mothers of diagnostic tests itself probably caused high anxiety.

On the other hand, the results of studies showed that the diagnostic tests' process of embryonic anomaly and the awareness of pregnant mothers of their positive results led to considerable stress and anxiety socially, physically, mentally and emotionally (Kaasen et al., 2013; Fonseca, Nazaré and Canavarro, 2012; Irani et al., 2019). The study results of Irani et al. showed that, pregnant mothers knowing the positive result of embryonic anomaly use various strategies to deal with the stress, such as spirituality, attracting others' support, and searching information (Irani et al., 2019).

The study results of Brajenović-Milić et al. showed that, stress and anxiety increase in pregnant women before doing amniocentesis diagnostic test especially in women whose pregnancy has been unwanted and had pregnancy nausea and vomiting. Their results showed that, there was a significant negative relationship between the ratio of stress and anxiety of women with their spouses' companionship

understanding in the process of pregnancy. However, their findings showed that, the high stress and anxiety before amniocentesis could not be reduced, and more attention should be paid to the mental and psychological status of women by health care providers (Brajenović-Milić et al., 2010). The study results of Lee et al. in 2007 showed that, the anxiety ratio of pregnant mothers had decreased after doing normal sonography, but it was higher in mothers with positive aneuploidy result, and it was much higher in cases of embryonic anomaly, which was consistent to some extent with the results of present study.

Also, the study results indicated that, the ratio of depression in pregnant mothers had not changed significantly before and after doing amniocentesis, and did not have significant difference statistically. In this regard, the study results of Sanhal et al. (2015) showed that the anxiety and depression of mothers had increased after amniocentesis, which was somehow consistent with the results of present study. Dick (1996) also in his study concluded that the ratio of mothers' depression and anxiety, who had underwent amniocentesis, had increased after knowing the positive screening result, which was somehow consistent with present study results. Kowalcsek et al. (2002) also showed in their study that the ratio of anxiety and depression in mothers under invasive diagnostic procedures, such as amniocentesis was high, but it could be significantly reduced by imaging the fetus and showing it to the mothers and ensuring that the fetus is normal, which was relatively consistent with the results of the present study. In general, there aren't many studies about depression and its association with embryonic anomaly diagnostic procedures, and there is not enough knowledge in this regard, but with regard to the strong correlation and relationship between anxiety and depression, it can be concluded that high anxiety strengthens the ratio of depression that does not correspond with our study results.

However, regarding the accuracy and usefulness of the diagnostic procedures of embryonic anomaly, it can be concluded that despite having numerous side effects such as anxiety and stress, it can still be considered as a routine screening test. Dehpanah (2016) in his study concluded that due to the high accuracy and sensitivity and the desirable feature of amniocentesis diagnostic test, despite being stressful for pregnant mothers, it is suggested as a routine screening test. Monni's (2013) study results also showed that, amniocentesis was a reliable screening test for the diagnosis of congenital anomalies. In addition, the results of many studies have mentioned the effectiveness and usefulness of amniocentesis to diagnose embryonic abnormalities (Alldred et al., 2017; Khalili et al., 2012; Naghizadeh et al., 2015; Hasanzadeh et al., 2014). In their study, Nagizadeh et al. concluded that, screening in the second quarter was able to diagnose many cases of aneuploidy. So, it can be said that the efficiency and usefulness of this screening was to the extent that it could justify problems such as parental anxiety, high costs for screening, and doing invasive interventions such as amniocentesis. Therefore, with high confidence, this diagnostic method could be proposed as a routine screening method (Naghizadeh et al., 2015). Also, the study results of Hasanzadeh et al. showed that, there was a significant relationship between the increase of Down syndrome risk and amniocentesis results. They stated that, the amniocentesis diagnostic test among high risk cases identified by the first trimester pregnancy screening test, diagnosed 12% of them as aneuploidy cases (Hasanzadeh et al., 2014). According to the results of the performed studies, the usefulness and efficiency of diagnostic tests such as amniocentesis was revealed and it can be used with confidence.

Conclusion

The results of this study showed that, the stress and anxiety of candidate mothers for amniocentesis is high before the procedure, which is probably due to the lack of awareness of the procedure and the fear of injury to themselves and the fetus. Also, higher stress and anxiety after amniocentesis and its positive result could be interpreted in this way that, mothers did not know how to react to the reality of their fetal diagnostic abnormality and this issue could be considered as the loss of their fetus. Therefore, they showed a lot of stress and anxiety should be supported by the family and the associates. Thus, having used the results of this research, it is suggested that the respected authorities of the maternity wards and the therapeutic clinics and diagnostic clinics of obstetrics and gynecology present their staff necessary trainings about mental and psychological support and give required awareness to the pregnant mothers who are candidates for screening tests, and in this way reduce the stress and anxiety of pregnant mothers so that their fetus do not face more damages. The findings of this study can be a starting point for future researches and be a basis for research in other effective methods to promote the health of mothers and their infants and to identify the factors affecting their stress and anxiety.

The limitations of this study were the reliance on information that was obtained as self-report and completing questionnaire by pregnant mothers, as it may have some distances in estimating their stress and depression ratio assessment. Also, the present study was conducted only on pregnant mothers living in Tabriz, which limited the generalization of the results. Therefore, the results of this study cannot probably be generalized to pregnant mothers outside this area. Thus, in order to better generalize the results, it is suggested that this work be conducted at a wider level.

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