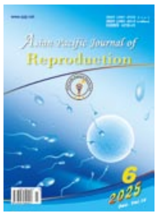

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Counselling based on reality therapy reduces the level of stress, anxiety, and depression in pregnant women awaiting amniocentesis result: A randomized trial

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ABSTRACT

Objective: To evaluate the effect of reality therapy counselling on the levels of stress, anxiety and depression of women awaiting the result of amniocentesis.

Methods: This randomized clinical trial was conducted on the pregnant women who had referred to genetic laboratory to provide their amniocentesis samples in Isfahan, Iran from November 2019 to February 2020. Pregnant women were divided into the control and intervention groups. The control group received routine care. The intervention group received reality therapy counselling during eight merged sessions (two sessions in week). Each therapy session lasted for 90 to 120 minutes. Both groups completed the Depression, Anxiety and Stress Scale-21 items (DASS-21) questionnaire level before and after the intervention. These three variables (depression, anxiety and stress) were the primary variables of the study.

Results: 64 pregnant women were included, with 32 in each group. Before the intervention, the mean score of anxiety and depression had no significant difference between the control and intervention groups, but after the reality therapy counselling, the mean scores of stress, anxiety, and depression in the intervention group decreased significantly compared to the control group (P<0.001).

Conclusions: Reality therapy counselling can be offered as a simple, effective and accessible way to reduce stress, anxiety and depression in women awaiting amniocentesis result.

KEYWORDS: Amniocentesis; Anxiety; Depression; Reality therapy; Stress

1. Introduction

Amniocentesis is a diagnostic procedure performed in pregnant women following the detection of chromosomal, genetic, or metabolic abnormalities through positive screening tests, or due to factors such as family history of genetic disorders, advanced maternal age, or ultrasound findings. This procedure may lead to complications, including fetal mortality before 24 weeks of

Key Points

Question: Can counselling based on reality therapy counselling affect women's stress, anxiety and depression levels in pregnant women awaiting amniocentesis result?

Findings: In this randomized trial, pregnant women who received counselling based on reality therapy had significantly lower mean scores of stress, anxiety and depression compared to pregnant women in the control group.

Meaning: Reality therapy counselling can be offered to policymakers as an effective and accessible way to reduce stress, anxiety and depression in these women.

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gestation, preterm delivery, low birth weight, rupture of membranes, and vaginal hemorrhage[1]. Considering the importance and necessity of amniocentesis, interventions to reduce and manage its complications are warranted.

One of the confirmed complications following amniocentesis is maternal stress, which can have serious consequences such as preeclampsia, spotting and bleeding, low birth weight and length, and meconium-stained amniotic fluid in the infant. Therefore, mental health screening programs and stress-reduction interventions during pregnancy are essential[2]. Prenatal stress can have lasting effects on children's behavioral outcomes, and recent evidence from animal studies has shown that the impact of stress during pregnancy may extend beyond the first generation[3].

Maternal anxiety during pregnancy is considered a risk factor for children's behavioral and emotional problems[4]. Depression, a mood disorder, can adversely affect mental health. Impaired mental health not only disrupts cognitive and emotional functioning but may also influence other aspects of well-being, including physical and social health[5].

Previous studies indicate that education and counseling are effective in reducing stress levels. Malakouti *et al* reported that short-term educational interventions positively affected perceived stress and anxiety in women undergoing amniocentesis[6]. Similarly, Mojahed *et al* confirmed the effectiveness of educational programs in reducing perceived stress in expectant mothers undergoing amniocentesis[7].

Reality therapy counselling is one of the approaches in counseling and psychotherapy, which is based on the theory of choose and control. This is a counselling approach grounded in choice theory, focusing on clients' present behaviors, personal responsibility, and their ability to make effective choices to satisfy fundamental psychological needs. The counsellor helps clients evaluate their current actions and adopt more responsible[8]. Elahi Nejad *et al* demonstrated that reality therapy counseling and neurofeedback reduced anxiety and depression in women with breast cancer, with reality therapy counseling showing a more significant effect than neurofeedback[9]. Reality therapy counseling has also been shown to decrease anxiety and depression and improve treatment adherence in patients with diabetes[10]. Moreover, this type of counseling can reduce clinical symptoms in patients with generalized anxiety disorder[11]. Soleimani *et al* reported that reality therapy counseling based on choice theory decreased anxiety and enhanced hopefulness[12].

Stress, anxiety, and depression can negatively affect pregnancy outcomes. Waiting for amniocentesis results often induces stress, anxiety, and depression in pregnant women. Based on previous studies, the simultaneous effect of reality therapy counseling on stress, anxiety, and depression has not been evaluated in this specific population. While this counseling method has been applied in populations such as women with breast cancer, students, and patients with diabetes, no interventions have been conducted to reduce these complications during the waiting period for amniocentesis results in pregnant women.

Therefore, the present study aimed to investigate the effect of reality therapy counseling on stress, anxiety, and depression in pregnant women awaiting amniocentesis results.

2. Methods

2.1. Study design and setting

The present study was a randomized clinical trial study which was conducted on 64 pregnant mothers (32 controls and 32 cases) who were referred to three Isfahan genetic laboratories to provide their amniocentesis samples. Isfahan has 3 genetic laboratories, and sampling was conducted from all three centers by the available sampling method. Using random allocation software version 1, women with the permutation blocks method were randomly allocated to two groups. This study was a parallel, two-arm, randomized controlled trial with a 1:1 allocation ratio. This study was conducted from November 2019 to February 2020.

2.2. Sample size determination

As described by Kordi *et al*, a sample size of n=32 was selected for each group[13].

2.3. Sampling

After selecting participants using a convenience sampling method, inclusion criteria were applied: women aged 15–49 years, with no history of neurological or psychiatric disorders, and no history of substance abuse. Exclusion criteria included missing any counseling sessions, failure to follow the session guidelines or exercises, unwillingness to continue participation, occurrence of acute or critical events during the study, and presence of acute psychotic disorders.

The objectives and procedures of the study were explained to all participants, and written informed consent was obtained prior to enrollment. No changes were made to the methods after trial commencement.

Allocation concealment was maintained using sequentially numbered, sealed, opaque envelopes prepared by a researcher not involved in participant recruitment or intervention delivery. After generating the random sequence through Random Allocation Software, the allocation codes were placed inside the envelopes. The envelopes were opened sequentially and only after each participant's enrollment, ensuring concealment of the assignment until the moment of allocation. The random sequence was generated by a member of the research team who was not involved in participant recruitment or intervention delivery. Participant recruitment and eligibility assessment were performed by the primary researcher after obtaining the necessary institutional permissions. After each eligible participant provided informed consent, the allocation code was assigned using the prepared envelopes, and group assignment (intervention or control) was carried out by another researcher who was not involved in outcome assessment.

2.4. Instruments

Demographic information was recorded using a questionnaire and the levels of anxiety, stress and depression were evaluated using the Depression, Anxiety and Stress Scale-21 items (DASS-21) questionnaire. The short form of this questionnaire has 21 items that would evaluate each of the psychological structures of depression, anxiety and stress through 7 items. Lovibond and Lovibond (1995) in a big sample consisted of 717 students, showed a high correlation of the Beck depression questionnaire using DAS scale (r=0.4). In addition, Abdin (2025) also confirmed the validity and reliability of this questionnaire and showed that the confirmatory factor analysis (CFA) confirmed that the original three-factor model fits their data. Cronbach's alpha coefficients for the depression, anxiety, and stress subscales were 0.91, 0.87, and 0.89, respectively[14].

The 21-item short form has been validated for the Iranian population by Sahebi *et al* in 2005[15].

2.5. Data collection

The researcher (M. GH) entered the research setting after obtaining the necessary permits from the University (Code of Ethics) and enrolling the study in the Iranian Registry of Clinical Trials (IRCT). Then, the purpose of the study was clarified to women who had undergone amniocentesis and brought the amniocentesis sample to genetic laboratories, with inclusion criteria referring to the research setting. After receipting verbal consent, in the present study the short form of DASS-21 with 21 items was used. Participants were then randomly assigned to the intervention and control groups. The intervention group received reality therapy counseling over eight sessions, conducted in small groups of 2–10 participants. The sessions were held in the consultation room of the genetics laboratory. Each session lasted between 90 and 120 minutes, with two sessions conducted per day, two days per week.

At the beginning of each session, the objectives were explained, and participants were reminded of the importance of confidentiality and adherence to privacy. Counseling was delivered according to a structured session plan, with step-by-step exercises outlined for each session.

At the beginning of each session, the content of the previous session was reviewed, exercises were evaluated and participants' questions were answered. At the end of 8 sessions of counselling, DASS-21 questionnaire was again completed by both groups.

The summary of the structure of the counselling sessions were: the aim of the first session was to establish connection and primary evaluation, and the aim of the second session was to find a perception toward general behavior and the five essential needs including love, survival, freedom, power and leisure and how to fulfill them. The third session focused on participants' perceptions of the current problem, understanding the specific representations of their qualitative world, and exploring whether these perceptions could be changed. The fourth session addressed the idea that all behaviors stem from one general behavior and explored current choices. The fifth session aimed to bridge the gap between participants' desires (qualitative world) and their current reality (perceived world), while helping them identify their needs and ways to fulfill them. The sixth session discussed how changing perceptions could lead to better decision-making, and the seventh session covered the psychology of internal and external control, emphasizing strategies to improve relationship quality using choice theory. The eighth session focused on the Want-Doing-Evaluation-Planning (WDEP) process, including developing a practical plan, selecting appropriate measures, and committing to them[8].

The counseling sessions were conducted by a midwifery counseling student certified in counseling. The counseling package for reality therapy was developed under the supervision of an associate professor of counseling and the research team through a comprehensive review of books and articles. All content of the package was approved by the research team, which included a master's degree student in counseling midwifery, a doctoral in reproductive health, and a counseling expert. Sessions were scheduled to be completed prior to the availability of amniocentesis test results.

The control group received routine care only, with no additional counseling, but they could apply for attending counselling sessions after this study. This study focused exclusively on three primary indexes: stress, anxiety, and depression. No secondary indexes were defined for this study.

2.6. Blinding

Participants and counselors could not be blinded due to the nature of the intervention. However, outcome assessors and the statistician were blinded. In this regard, we defined the study groups as A and B for a statistician.

2.7. Statistical analysis

Data were analyzed using IBM Corp., Armonk, NY, USA SPSS software version 22. The normality of the data was assessed using the Kolmogorov–Smirnov test. To compare the means, Mann-Whitney test, paired t test, independent t test, Wilcoxon test, and analysis of covariance (ANCOVA) were used. Data are expressed as n(%) and mean±standard deviation (mean±SD). The level of significance for all the statistical tests was set at 0.05.

2.8. Ethics approval and consent to participate

The study was approved by the Ethics Committee of Kerman University of Medical Sciences with the Code of Ethics (IR. KMU.REC1398,020) and ethics approval date was 09.08.2019. It was registered in the Iranian Registry of Clinical Trial (IRCT) (IRCT20190423043351N1). At the beginning of the sampling process, the study purposes were described to the target population, and verbal consent was attained. After completing the initial sampling, the purposes and method of the study were fully clarified to the participants who met the inclusion criteria and written informed consent was taken from all of the participants. All participants were also guaranteed that their information was kept confidential and anonymous and that the research results would be used and published only for research purposes and they could withdraw at any time. All methods were carried out in accordance with relevant guidelines and regulations (Declaration of Helsinki).

3. Results

3.1. Demographic variables

The flowchart of the study is presented in Figure 1. According to the gathered data, the mean age of participants was (33.2±5.6) years and 87% of them were housewives. 73% of them had no history of abortion. No significant differences were observed between the intervention and control groups regarding mean age, marriage age [(23.4±5.5) years] and age at first pregnancy [(25.6±5.8) years] (all P>0.05). A total of 84% were between 19 and 34 years old at the time of their first pregnancy. Additionally, 55% had one child. The other variables are listed in Table 1.

3.2. Comparing the mean scores of stress, depression and anxiety

Before the intervention, there were no statistically significant differences in the mean scores of depression, and anxiety between the intervention and control groups among pregnant women awaiting amniocentesis results. Since there were statistically significant differences in baseline stress levels between the two groups before the intervention, ANCOVA was used to compare post-intervention stress scores, controlling for baseline values.

After the intervention, comparison of the mean scores indicated that the intervention group had lower stress, depression, and anxiety scores than the control group, and these differences were statistically significant.

Comparison of pre- and post-intervention mean scores revealed that stress and anxiety significantly decreased in the intervention group, whereas no significant changes were observed in the control group according to the Wilcoxon test. For depression, the mean score decreased significantly in the intervention group after the intervention, while it increased significantly in the control group (Table 2).

4. Discussion

In the present study, intervention was conducted using group reality

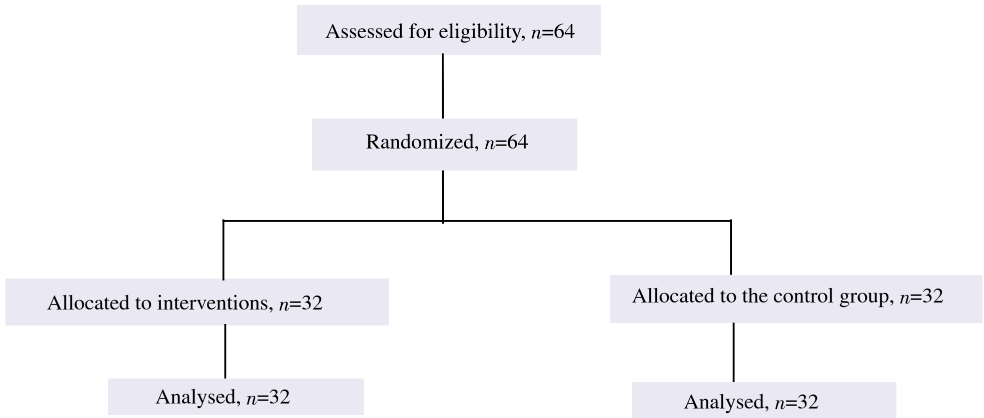

Figure 1. Flowchart of the study.

Table 1. Distribution of demographic variables in pregnant women in two groups.

Variables	Control n(%)	Intervention n(%)	P-value
Age*, years			
≤34	18(56)	15(47)	0.45
>34	14(44)	17(53)	
Marriage age, years			
≤18	4(13)	5(16)	0.56
19-34	26(81)	27(84)	
≥35	2(6)	0(0)	
Age at first pregnancy, years			
≤18	0(0)	3(9)	0.24
19-34	29(91)	25(78)	
≥35	3(9)	4(13)	
Number of deliveries			
0	5(16)	9(28)	0.37
1	15(47)	15(47)	
≥2	12(38)	8(25)	
Number of children			
0	5(16)	9(28)	0.48
1	19(59)	16(50)	
≥2	8(25)	7(22)	
Educational level			
Less than high school	5(16)	6(19)	0.74
Higher education	27(84)	26(81)	
Occupation			
Homemaker	28(87)	28(87)	>0.99
Employed	4(13)	4(13)	
Husband's educational level			
Less than high school	9(28)	9(28)	0.64
High school diploma	14(44)	17(53)	
College or higher	9(28)	6(19)	
Husband's occupation			
Permanent	17(53)	14(44)	0.45
Temporary	15(47)	18(56)	
Residence			
Homeowner	18(65)	13(41)	0.21
Rented	14(44)	19(59)	
History of abortion			
No	26(81)	21(66)	0.15
Yes	6(19)	11(34)	
History of having an abnormal infant			
No	30(94)	28(88)	0.39
Yes	2(6)	4(12)	
Income			
Low income#	15(47)	9(28)	0.20
Middle income#	8(25)	14(44)	
High income#	9(28)	9(28)	

*The age cutoff of 34 years is chosen because it is close to the mean age of the participants (33.2 years). Categorizing participants as ≤34, >34 years reflects the central tendency of the data more accurately than using 35 years as a cutoff. #Low income: less than $1 135 per capita; #Middle income: $1 136–$4 495 per capita; #High income: more than $4 495 per capita.

therapy counselling. The results showed that this intervention has been effective on the levels of anxiety, stress and depression in pregnant women expecting the result of amniocentesis.

Globally, reality therapy counselling has been confirmed to be effective on psychological elements, problems and disorders[16]. In line with the study of Zhang *et al* similar to the present study, that study also used reality therapy counselling with emphasis on internal control rather than external control and also suggested creating responsible behaviors[17]. A study showed the effect of changes in physical activity, self-efficacy and self-regulation during a brief intervention on future stress levels of employed others[18]. The feeling that one could do something about their own life and have the main determinant part of their fate and also would be able to change and rebuild their own future, would increase their self-esteem and decrease their concerns, which is the main characteristic of anxiety; this result was in line with the study of Soleimani *et al*[12]. Also, a meta-analysis study showed virtual reality counselling is safe and effective in relieving maternal labor pain and anxiety[19]. This study was in line with the study of El-Qirem *et al*; their findings suggest the importance of integrating virtual reality therapy counselling as an effective intervention to minimize stress and anxiety, and enhance physiological measures among university students[20]. In another study, results showed that fully immersive virtual reality counselling training improved cognitive functioning, executive functioning, and attention in mild cognitive impairment patients but was less effective in improving memory[21].

Table 2. Comparing the score of stress, depression and anxiety in pregnant women awaiting amniocentesis result of two groups.

Variables	Control	Intervention	#P-value
Stress			
Before intervention	14.9±4.5	17.7±4.5[a]	0.025
After intervention	18.0±1.8	12.5±3.5[b]	0.001
Depression			
Before intervention	12.5±4.7[a]	14.4±5.0[a]	0.15
After intervention	14.5±6.1[b]	11.2±3.7[b]	0.01
Anxiety			
Before intervention	12.4±4.4	13.4±4.8[a]	0.40
After intervention	13.7±5.5	10.6±3.1[b]	0.02

Data are expressed as mean±SD. #P-values indicate the comparison between the control group and the intervention group. a, b indicate statistical differences before and after intervention at the same group, P<0.05.

It was also consistent with the study by Feyzi *et al*, whose primary aim in interventions based on acceptance and commitment was to promote psychological flexibility by considering motivational aspects alongside cognitive ones. This type of treatment led to reduced anxiety and depression scores after the intervention[22]. It was also in line with the study of Kordi *et al*, who performed individual and group education to increase mothers' awareness which led to a significant decrease in the level of anxiety and concern in pregnant mothers[13]. Comparing the mean score of depression before and after the intervention in both groups of intervention and control showed a significant decrease in the score of depression which was in line with the study Elahi Nejad *et al*[9]. This study was based on the fact that every individual chooses their own behaviors and is responsible for their lives, actions, feelings and thoughts. This was also in line with the study of Sarabi *et al*; having self-esteem is one of the human's fundamental needs. The more vulnerable an individual, the more self-esteem they would need[23]. In this study, using one type of relaxation method—particularly music—has been emphasized. Shi *et al* revealed that virtual reality–based counseling has significant advantages in optimizing the psychological and physiological states of pregnant women; however, its direct effect on fetal heart rate is not significant[24].

The most important strength of this study is the use of reality therapy counselling on a specific group of women, which has received less attention in other studies.

One limitation of this research is that only a small number of factors associated with stress anxiety and depression were examined. Hence, it is essential to explore the role of other cultural, behavioral and emotional factors in symptoms. Further research with a larger sample size is required to accurately differentiate between the variables.

In conclusion, in the present study, performing reality therapy counselling has been effective on the level of anxiety, stress, and depression in pregnant mothers expecting the result of amniocentesis. Therefore, this method can be used as a suitable and accessible treatment for policymaker in the field of midwifery in reducing pregnant women's stress and anxiety.

Conflict of interest statement

No conflicts of interest were declared concerning the publication of this article.

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Authors' contributions

Firoozeh Mirzaee and Maryam Ghaderi Najafabadi conceived and designed the study. Data collection was carried out with the participation of Maryam Ghaderi Najafabadi, Atefeh Ahmadi and Nader Shahrokhi; Moghaddameh Mirzaee contributed to the interpretation of data. All of authors provided expertise throughout the study and contributed to the critical revision of the manuscript.

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References

[1] Chaksuwat P, Wanapirak C, Piyamongkol W, Sirichotiyakul S, Tongprasert F, Srisupundit K, et al. A comparison of pregnancy outcomes after second-trimester amniocentesis between cases with penetration of the placenta and nonpenetration. *J Matern Fetal Neonatal Med* 2021; **34**(23): 3883-3888.

[2] Abedi M, Saboory E, Rabiepour S, Rasoli J. The relationship between stress in pregnancy, and pregnancy outcomes: A longitudinal study. *Nurs Midwifery J* 2017; **14**(12): 969-981.

[3] Braun K, Bock J, Wainstock T, Matas E, Gaisler-Salomon I, Fegert J, et al. Experience-induced transgenerational (re-)programming of neuronal structure and functions: Impact of stress prior and during pregnancy. *Neurosci Biobehav Rev* 2020; **117**: 281-296.

[4] Henrichs J, van den Heuvel MI, Witteveen AB, Wilschut J, Van den Bergh BR. Does mindful parenting mediate the association between maternal anxiety during pregnancy and child behavioral/emotional problems? *Mindfulness* 2021; **12**(2): 370-380. doi: 10.1007/s12671-019-01115-9.

[5] Hankin BL, Demers CH, Hennessey EP, Perzow SED, Curran MC, Gallop RJ, et al. Effect of brief interpersonal therapy on depression during pregnancy: A randomized clinical trial. *JAMA Psychiatry* 2023; **80**(6): 539-547.

[6] Malakouti J, Mirghafourvand M, Milan RD. The effect of education on perceived stress and anxiety in high risk pregnant women awaiting for amniocentesis: A quasi-experimental study. *J Midwifery Reprod Health* 2023; **11**(4): 3946-3958. doi: 10.22038/jmrh.2023.65033.1898.

[7] Mojahed S, Tabatabaei RS, Reihani F, Dehghani A, Khavari F. The effect of education on anxiety of pregnant mothers before amniocentesis. *J Educ Health Promot* 2021; **10**(1): 61.

[8] Alipour M, Ghahremani L, Amooee S, Keshavarzi S. The effectiveness of relaxation techniques on depression, anxiety and stress in pregnant

women: Based on self-efficacy theory. *Sci J Kurd Univ Med Sci* 2017; **22**(3): 20-30.

[9] Elahi Nejad S, Makvand-Hosseini S, Sabahi P. Effect of neurofeedback therapy *versus* group reality therapy on anxiety and depression symptoms among women with breast cancer: A clinical trial study. *Iran Quart J Breast Dis* 2019; **11**(4): 39-52.

[10]Farshchi N, Kiani Q, Chiti H. Effectiveness of group therapy reality in reducing depression, anxiety and increased compliance to treatment in patients with diabetic type 1. *J Zanjan Univ Med Sci Health Services* 2018; **26**(117): 74-85.

[11]Jalalinia V. Reality therapy and reduction of clinical symptoms in people with generalized anxiety disorder. *Contemp Psychol* 2017; **12**: 487-492.

[12]Soleimani E, Babaee K. The effectiveness of group reality therapy training based on the theory of choice on anxiety and the hope of drug addicts while leaving. *Quarterly J Res Addict* 2016; **37**(10): 138-150.

[13]Kordi M, Riyazi S, Lotfalizadeh M, Shakeri MT, Jafari Suny H. Comparison of the effects of group and individual education on the anxiety and anxiety of pregnant women about screening of embryonic chromosomal abnormalities. *Iran J Obstet Gynecol Infertil* 2015; **18**(157): 1-10.

[14]Abdin E, Tan B, Chang S, Ellaisha S, Brian T, Charmaine T, et al. Validity, reliability, measurement invariance, and equipercentile linking of the depression anxiety stress scale-21 in the youth population in Singapore. *Front Psychol* 2025; **16**: 1563190.

[15]Sahebi A, Asghari MJ, Salari RS. Validation of depression anxiety and stress scale (DASS-21) for an Iranian population. *Iran Psychol* 2005; **4**(1): 299-313.

[16]Zeng W, Xu J, Yu J, Chu X. Effectiveness of virtual reality therapy in the treatment of anxiety disorders in adolescents and adults: A systematic review and meta-analysis of randomized controlled trials. *Front Psychiatry* 2025; **16**: 1553290. doi: 10.3389/fpsyt.2025.1553290.

[17]Zhang W, Paudel D, Shi R, Liang J, Liu J, Zeng X, et al. Virtual reality exposure therapy (VRET) for anxiety due to fear of COVID-19 infection: A case series. *Neuropsychiatr Dis Treat* 2020; **16**: 2669-2675.

[18]Wang H, Zhang T, Lu M, Zeng Y, Xiao Y, Ren X, et al. Effects of physical activity and counselling interventions on health outcomes among working women in Shanghai. *J Sports Sci Med* 2021; **20**(1): 77-85.

[19]Xu N, Chen S, Liu Y, Jing Y, Gu P. The effects of virtual reality in maternal delivery: Systematic review and meta-analysis. *JMIR Serious Games* 2022; **10**(4): e36695. doi: 10.2196/36695.

[20]El-Qirem FA, Malak MZ, Bani Salameh AK, Ali R, Alsswey A. Effect of virtual reality therapy on stress and anxiety symptoms, and physiological measures among University students: An experimental study in Jordan. *Curr Psychol* 2023; **42**(22): 18997-19005.

[21]Yu J, Song J, Shen Q. Effects of fully immersive virtual reality training on cognitive function in patients with mild cognitive impairment: A systematic review and meta-analysis. *Front Hum Neurosci* 2024; **18**: 1467697.

[22]Feyzi J, Moradi A, KhajeDeloui M, KHadem N. Effectiveness of acceptance and commitment therapy for anxiety and depression in pregnant women by intrauterine fertilization. *Clin Psychol Stud* 2017; **7**(27): 1-21.

[23]Sarabi P, Parvizi F, Kakabaraee K, Babaei Garmkhani M, Kalhori N. Effectiveness of reality therapy on self-esteem of elderly couples afflicted with depression. *Rooyesh–e–Ravanshenasi J* 2019; **8**(2): 203-210.

[24]Shi X, Liang C, Ren H, Liao C, Yue N. The effect of virtual reality on pregnant women and fetuses: A systematic review and meta-analysis of randomized controlled trials. *Arch Gynecol Obstet* 2025; **312**(2): 337-350. doi: 10.1007/s00404-025-07971-2.

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