

RESEARCH ARTICLE

The influence of mindfulness-based stress reduction (MBSR) on stress, anxiety and depression due to unwanted pregnancy: a randomized clinical trial

FATEME KHAJOEI NEJAD¹, KATAYOUN ALIDOUSTI SHAHRAKI², PARVIN SALEHI NEJAD³,
NOSHIRVAN KHEZRI MOGHADDAM⁴, YONES JAHANI⁵, PARISA DIVSALAR⁶

¹Nursing Research Center, Faculty of Nursing and Midwifery, Kerman University of Medical Sciences, Kerman, Iran;

²Midwifery Department, Razi Faculty of Nursing and Midwifery, Kerman University of Medical Sciences, Iran;

³Department of Midwifery, Razi School of Nursing and Midwifery, Kerman University of Medical Sciences, Kerman, Iran;

⁴Assistant Professor, Shahid Bahonar University of Kerman, Kerman, Iran; ⁵Modeling in Health Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran - Department of Biostatistics and Epidemiology, School of Public Health, Kerman University of Medical Sciences, Kerman, Iran; ⁶Assistant professor of psychiatry, fellowship of psychosomatic Medicine, MD, Neuroscience Research Center, Institute of Neuropharmacology, Department of Psychiatry, school of medicine, Kerman University of Medical Sciences, Kerman, Iran

Keywords

Mindfulness-based stress reduction (MBSR) • Unintended pregnancy • Stress • Anxiety • Depression

Summary

Background. Individuals with unwanted pregnancies often experience high levels of anxiety, stress and depression that associated with maternal-neonatal outcomes. Mindfulness training is a safe and acceptable strategy to support mental health before parturition.

Purpose. The main objective of present study was to evaluate the influence of eight-week application of mindfulness-based stress reduction on stress, anxiety and depression caused by unplanned pregnancy.

Method. In this study, 60 women with unwanted pregnancy before 32 weeks of gestational age were selected and randomly divided into two groups. Intervention group received MBSR sessions, practice at home and the recorded sound. Mental health was evaluated before intervention and at the end of the eight sessions by standard

stress, anxiety and depression DASS-21 questionnaire. Data were analyzed using Chi-square, Mann-Whitney U and Wilcoxon tests.

Findings. In order to compare pre-test and post-test scores in each group, the Wilcoxon Test was used. The results revealed that the participants in the intervention group reported a significant decrease in mean scores of stress, anxiety and depression compared to baseline ($P = 0.0$). Whereas no significant decrease in mean stress, anxiety and depression score were found in control group. P-value was estimated to be 0.346, 0.212 and 0.343 respectively.

Conclusions. The mindfulness program has effectively reduced stress, anxiety and depression. Further research is needed to investigate the mechanisms and effects of mindfulness on maternal-neonatal outcomes.

Introduction

An unwanted pregnancy is unwanted or mistimed pregnancy. A mistimed pregnancy occurs in women who conceived sooner or later than the desire time. It happens in women who do not want any more children at the time of the conception [1].

Studies have shown that 49-51 percent of pregnancies in the United States of America are unwanted. Over time, the number of births due to requested pregnancy is decreased and births due to unwanted pregnancy are increased [2]. Unwanted pregnancy can lead to a wide range of physical and psychological consequences for mother and child and affects different aspects of social, economic and cultural health of the community [3, 4]. Women with unwanted pregnancies are most likely to receive inadequate pre-partum care and there were observed also high rates of alcohol consumption and smoking as well as premature labor as well as low birth weight and lactation among them [3, 5, 6]. In addition, the risk of physical and mental health problems increases among their children [3, 7, 8] which is one of

the global concerns due to its association with physical, mental, social and economic consequences [9]. Unwanted pregnancy is one of the most common and debilitating factors of women's mental health in fertility ages which, in turn, causes depression during pregnancy and after childbirth [10]. According to Abajobir et al. (2016), the prevalence of depression during pregnancy in women with unwanted pregnancies is twice [11]. Anxiety and depression are often experienced simultaneously [12, 13]. Anxiety appears to be influenced by emotion-oriented coping styles including emotional, selfish responds and fantasy reactions. Therefore, it is likely for consistent coping program such as mindfulness-based stress reduction program [MBSR] to reduce depression, anxiety and stress [13]. Early pregnancy depression in addition to predicate post-partum depression symptoms increases anxiety and stress in late pregnancy [14]. Based on the studies, unwanted pregnancy is associated with high levels of depression and perceived stress [15-18]. High stress level increases the risk of maternal mental health problems by mitigating coping skills [11]. In response to the stress levels, mindfulness

increasingly focuses on mental concentration as a key stress management strategy in order to help individuals more effectively respond to stressors [19]. According to the findings, MBSR program has been effective in reducing psychological symptoms [13, 20]. However, the potential benefits of MBSR program were not addressed in reducing depression, anxiety and stress among unplanned pregnant women. Accordingly, the purpose of this study was to investigate the effectiveness of counseling of MBSR as an intervention to reduce unwanted pregnancy depression, anxiety and stress.

Methods

TYPE OF STUDY

The data were collected from a randomized clinical trial in which the effect of independent variable, MBSR, on dependent variable, psychological reactions (e.g. anxiety, depression and stress), was measured.

SAMPLES AND STATISTICAL POPULATION

Participants were eligible pregnant women with unplanned pregnancies under 32-weeks of gestational age. Studies show that women with unwanted pregnancies are less likely to seek prenatal care and sometimes may not return until late in pregnancy. Since the purpose of this study was only to investigate the effect of mindfulness on mental disorders in women with unwanted pregnancies; therefore, to access more samples, we examined pregnant women under 32 weeks of gestational age. Sampling was carried out in Sirjan-kerman health center from 2018 to 2019.

INCLUSION CRITERIA

Inclusion criteria involved having a spouse aged 15-49 years, pregnancy less than 32 weeks [21, 22] and not suffering neuro-psychiatric disorder, absence of drug abuse, Lack of psychiatric medication as well as lack of convulsions and mental disability, readiness and consent to participate in this study.

EXCLUSION CRITERIA

The exclusion criteria included missing more than 2 sessions in training course, failure to follow instructions and exercise related to each session, participant's unwillingness to continue, stressful events, acute and unexpected events at each stage of the plan and acute psychotic disease.

SAMPLE SIZE AND SAMPLING

Using software GPower V.3.1 and sample size formula to compare mean values at two groups and taking $\alpha = 0.05$ and $1-\beta = 0.9$, standard deviation of 6.22 depression in the study of Hosseini Shahidi et al. [23], and the difference of average at least 5 aspects of depression in two groups into account, the sample size included in each group was estimated to be 25 subjects. Taking the

loss of sample size by 15%, 30 subjects were considered. In this randomized cluster sampling, 6 health centers were selected from the existing 19 centers. Two health centers selected from each districts of the city; One center was considered as an intervention and one as a control. Thus, all pregnant mothers under 32 week of pregnancy were contacted by telephone and those who had unplanned pregnancies were invited to clinic to complete the questionnaire. Women who had a stress score higher than 14 or an anxiety score higher than 7 or a depression score higher than 9 were identified. So, 60 people, 10 eligible patients from each center were selected. Afterward, among those with psychological symptoms, 30 subjects were selected for intervention group and 30 subjects were selected for control group, randomly (Fig. 1).

DATA COLLECTION AND METHODOLOGY

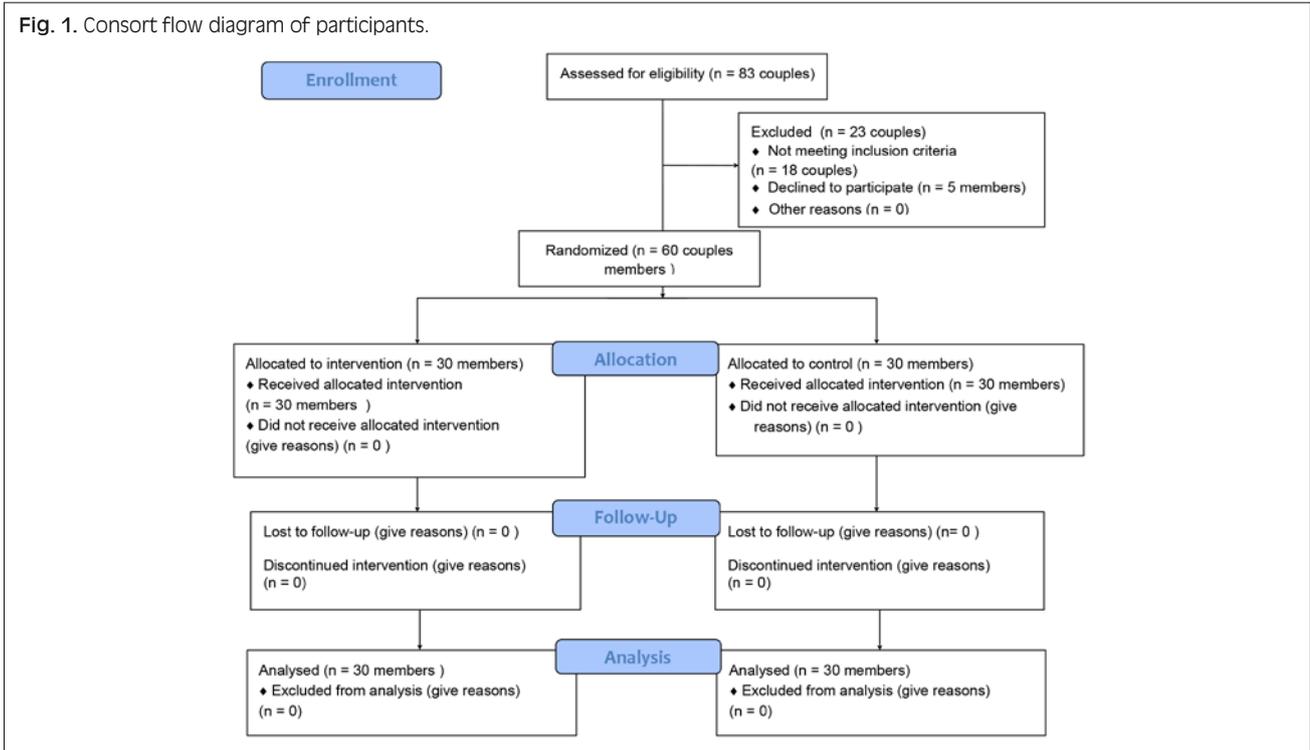
The protocol for this study was reviewed and approved by the human ethics committee of Kerman University of medical science (IR.KMU.REC.1397.487). 60 women with unplanned pregnancies who had at least one designated case of cut off for stress, anxiety or depression responded to the invitation to participate and informed and written consents were obtained from the participants.

Subjects were randomly divided into two groups of MBSR treatment and control. The main content of MBSR program was standard yoga, sitting, walking, breathing, body scan and eating meditation; that was performed by a mental health midwife who had educated in counselling in midwifery and was trained about several kinds of intervention for improving mental health. This program was conducted for 8 sessions and each session lasted for 2 hours (one session per week). Participants followed instructions for mindfulness meditation, exercise group discussion and homework assignments during 8 weeks. The control group received only routine pregnancy training and care. The summary of training session is presented in Table I. In the eight sessions and at the end of the program, the questionnaires were again reviewed for depression, anxiety and stress in each group. control group were at waiting list and also after the post-test, an educational pamphlet containing a summary of the contents of the counseling sessions was provided to them.

MEASURING TOOLS

Depression, anxiety and stress DASS-21 scale was used. This scale contains 21 items related to three subscales of depression DASS-21, anxiety DASS-21 and stress DASS-21. That is the summarized version of fundamental DASS-21 questionnaire that includes 7 items per subscales. Items were expressed on a 4-point Likert spectrum ranging from 0 to 3 meaning 0 = no and 3 = most of the time, and the sum of the scores obtained from each scale would be multiplied by 2. The range for each scale is from 0 to 42. Higher scores reflect higher levels of depression, anxiety and stress. The Cronbach's Alphas for depression, anxiety and stress were 0.82, 0.90 and 0.93, respectively [23].

Fig. 1. Consort flow diagram of participants.



Tab. I. Summary of mindfulness-based stress reduction (MBSR) intervention session.

Session	Schedule per session
Pre-session	Early acquaintance with the participants, establishing a proper relationship aiming at filling in the questionnaires correctly, building confidence and performing the pre-test
First session	Introducing the therapist and the participants to each other as well as explaining the rationale for the treatment, the way it works, the psychology of stress, its response to raisins, body scan exercises
Second session	Discussion on homework and body scan and meditation practice, and distributing second session booklets and meditation audio file
Third session	Discussion on sitting meditation with a focus on breathing and practicing Hatayoga and limiting its application due to pregnancy
Fourth session	Discussing walking meditation and discussing the experiences of the participants during the exercises and present yoga
Fifth session	Talking about homework and focusing on mind-boggling thoughts, discussing participants' experiences during rehearsals and recording unpleasant events
Sixth session	Talking about homework and meditation and body checking and discussing participants' experiences during workouts and recording enjoyable events and presenting homework on meditation and scanning body and mind in everyday life
Seventh session	Talking about homework and meditation sitting and discussing participants' experiences during the practice and presenting homework and distributing the seventh session booklet and meditation audio file
Eighth session	reviewing all sessions and summarizing them with participants and providing guidelines for continuing mindfulness exercises after the end of the course and post-test

In a study by Henry and Crawford (2005) and present study, these coefficients were reported as -0.851, -0.712 and 0.875, respectively. The cutoff scores from which the samples were included were considered 15 for stress, 8 for anxiety and 10 for depression.

UNPLANNED PREGNANCY

We consider pregnancy based on positive pregnancy test that was taken at health center. We examined the unwanted pregnancy based on a number of questions:

1. did you plan to have a baby before the pregnancy?;
2. did you feel happy when you found out you were pregnant?;
3. did you seek approaches for your abortion?;

4. did you and your spouse plan to get pregnant?;
5. when you became pregnant, did you plan to be pregnant or did you wanted to become pregnant in the future?

DEMOGRAPHIC INFORMATION BACKGROUND PROPERTIES

Demographic information of fertility characteristics was initially evaluated including age, age of marriage, age of first menstruation, age of first pregnancy, number of children, type of previous pregnancy, the type of unwanted pregnancy, the type and cause of current unwanted pregnancy and consistency with

Tab. II. Participants' characteristics.

Characteristics	Intervention group		Control group		P-value
	N	%	N	%	
Type of unwanted pregnancy					
Mistimed	23	76.7	21	70	0.559
Unwanted	7	23.3	9	30	
History of unplanned pregnancy					
Positive	3	10	3	10	0.99
Negative	27	90	27	90	
Cause of UP					
Low age difference between children	9	30	8	26.7	0.742
Financial problems	6	20	4	13.3	
Marital problems	3	10	1	3.3	
Lack of preparation	10	33.3	7	23.3	
High age and sufficiency of number of children	7	23.3	5	16.7	
Inconsistency with pregnancy					
Mother	13	43.3	14	46.7	0.99
Father	1	3.3	0	0	
Both	16	53.3	16	53.3	
Prenatal prevention method					
Normal	23	76.7	19	63.3	0.575
Lack of prevention	3	10	6	20	
Tablet	2	6.7	2	6.7	
IUD	1	3.3	1	3.3	
Ampoules	1	3.3	0	0	
Condom	0	0	6.7	2	
Education					
Under the diploma	3	10	3	10	0.99
Diploma	15	50	15	50	
Associate's degree	4	13.3	4	13.3	
Bachelor	8	26.7	8	26.7	
Employment state					
Housewife	28	93.3	28	93.3	0.99
Employed	2	6.7	2	6.7	
History of depression					
Positive	4	13	3	10	0.99
Negative	26	86.7	27	90	
Income level					
Less than 90\$	3	10	3	10	0.99
90\$ to 170/94\$	13	43.3	13	43.3	
170/95\$ to 256/41\$	10	33.3	10	33.3	
256/42\$ to 341/88\$	4	13.3	4	13.3	
More than 341/88\$ millions	1	3.3	1	3.3	
Type of previous delivery					
Natural childbirth	13	43.3	13	43.3	0.99
Cesarean	7	23.3	7	23.3	
No delivery	10	33.3	10	33.3	

a = Chi-square or fishers exact test.

partner, education, employment status and family income level.

DATA ANALYSIS

SPSS version 22 was used to analyze the data. Chi-square, T-test and Mann-Whitney U were used to compare baseline values of demographic and dependent variables between the two groups. Mann-Whitney U and Wilcoxon Test were used to compare stress, anxiety

and depression variables between the intervention and control group.

Results

SAMPLE SPECIFICATIONS

Tables II and III show that there were no significant differences between intervention and control groups

Tab. III. Participants' characteristics.

Characteristics	Intervention group	Control group	Test statistic	P-value
	Mean ± SD	Mean ± SD		
Age	28.93 ± 5.62	29.30 ± 6.32	-0.237 ^b	0.813
Age of first menstruation	13.36 ± 1.58	13.13 ± 1.008	0.680 ^b	0.5
Age of pregnancy	24 ± 5.98	24.66 ± 6.78	-0.404 ^b	0.688
Marriage age	21.66 ± 3.38	21.1 ± 4.42	-0.586	0.588
Age of first pregnancy	23.4 ± 4.11	22.73 ± 4.72	-0.401	0.688
Number of children	1.03 ± 0.88	1.03 ± 0.88	0.001	0.99
Number of parturition	1.03 ± 0.88	1.03 ± 0.88	0.001	0.99

^b: independent sample T test; c: Mann-Whitney U.

Tab. IV. Comparison of stress, anxiety and depression between control groups (n = 30) and intervention group (n = 30).

Variable	Pre-test			Post-test		
	Intervention	Control	*P-value	Intervention	Control	*P-value
	Mean ± SD	Mean ± SD		Mean ± SD	Mean ± SD	
Stress	23.86 ± 0.859	25.40 ± 8.07	0.523	8.86 ± 5.45	23.86 ± 8.74	P < 0.0001
Anxiety	13.20 ± 7.05	12.20 ± 6.06	0.558	3.33 ± 2.98	13.6 ± 6.54	P < 0.0001
Depression	19.80 ± 16.13	18.8 ± 7.95	0.406	4.6 ± 5.09	17.86 ± 9.9	P < 0.0001

*Mann-Whitney U.

Tab. V. Comparison of stress, anxiety and depression before and after intervention by breakdown into intervention and control groups in women referred to health center.

Variable	Intervention		*P-value	Control		*P-value
	Pre-test	Post-test		Pre-test	Post-test	
Stress	23.86	8.86	P < 0.0001	25.40	23.86	0.436
Anxiety	13.20	3.33	P < 0.0001	12.20	13.60	0.212
Depression	19.80	4.60	P < 0.0001	18.8	17.86	0.434

*Wilcoxon.

with unplanned pregnancy in terms of demographic variables such as age, age of first menstruation, age of first pregnancy.

There was no significant difference between the two groups in terms of anxiety, depression and stress before intervention (P > 0.05). There were statistically significant differences between two groups after intervention based on Table IV (P = 0). The mean score of depression in the intervention group decreased significantly (P = 0). There was also slight decrease in the mean depression score in the control group. However, this decrease was not significant (P = 0.343). The mean score for stress in the intervention group decreased significantly after intervention (P = 0). In the control group, the mean score for stress decreased while this decrease was not significant (P = 0.346). The mean score for anxiety in the intervention group decreased significantly after intervention (P = 0) while the score in control group increased slightly (P = 0.212) (Tab. V).

Discussion

The purpose of this study was to evaluate the effectiveness of mindfulness based-stress reduction program on reducing the psychological symptoms of unplanned pregnancy. Results indicated a significant decrease in stress, anxiety and depression in the intervention group, which are in line with the results of other studies such as Guth et al. (2017) who examined the effects

of mindfulness on 54 pregnant women with psychotic symptoms and found a significant reduction in anxiety and depression symptoms. Mindfulness is an ideal and low-risk intervention that is associated with reducing stress, anxiety as well as improving mood and quality of life [24]. Also Setterborg et al. (2017) examined the effects of mindfulness based-stress reduction counseling on childbirth and parenting on pregnant women and found reduction in the symptoms of depression, anxiety and stress [25]. Jing et al. (2016) showed that mindfulness-based intervention significantly increases mindfulness, self- efficacy, coping strategy and significant reduction in emotional adjustment problems , passive and active coping strategy in pregnant women which is probably due to high degree of awareness at modern age without judgment in pivot mindfulness interventions and it seems to help cure emotional problems [26]. No significant difference was observed between control and intervention groups in the study of Krusche dphil et al. (2018) which is inconsistent with the findings of the present study. This is probably due to virtual teaching style of the consultation and the lack of regular attendance at the meetings such that in virtual education, due to absence advisor to address problems and questions of clients and the lack of social support from other participants, the level of contact with researcher and the low motivations in participants the level of learning is low [27]. In the study of Goodman et al. (2014), coping with anxiety through living mindfully which is kind of mindfulness-based cognitive therapy significantly reduces the level

of anxiety after intervention. Probably, it is because this program teaches common ways of responding to anxiety symptoms that include mindfulness techniques, cognitive approaches, training of anxiety and depression and cognitive distortions of anxiety and depression along with homework to encourage using mindfulness in daily life through regular practice [28]. The findings in study of Guardino et al. (2013) indicated the effectiveness of mindfulness to reduce stress and anxiety in pregnancy in the intervention group which was consistent with the present study. But the decrease in anxiety in the control group was not consistent with present study [22]; which is probably due to using book to increase information about pregnancy that works in stress management and some of them were attending a yoga class. The results of Nyklicek et al. (2018) and Hicks et al. (2018) showed that mindfulness skills during pregnancy are effective predictors of depressive symptoms during pregnancy and birth weight and are known as predictors of depressive symptoms in parents such that people with lower mindfulness showed higher levels of depression before delivery [29, 30]. Data analyzed in this study supported the possibility of offering a stress-reduction mindfulness program for women with unplanned pregnancy and can help reduce stress, anxiety, and depression in them. However, more similar studies are needed.

Conclusions

According to the results of the present study, early intervention in women with unplanned pregnancy can reduce stress, anxiety and depression and increase mothers' awareness, as pregnant mothers are vulnerable stratum of society and unwanted pregnancies increase mental health problems and awareness-making in the health system can be of particular importance.

Acknowledgements

Funding sources: KMU. grant (97000146). This article is the result of a dissertation approved by Kerman University of Medical Sciences with the code of ethics number IR.KMU.REC.1397.487., and clinical trial code IRCT20151103024866N14 supported by the research deputy of Kerman University of Medical Sciences. The purpose of the study was explained to the subjects, and they were included in the study after delivering written informed consent.

We would thank the research deputy of Kerman University of Medical Sciences. Thanks to all the staff of Sirjan Medical Center and the participants in the research and support of all those who somehow contributed to this research.

Conflicts of interest statement

The authors declare no conflict of interest.

Authors' contributions

FKH and KA designed the work and drafted the manuscript. NKH and PD had prepared counselling package. PS and KA had full access to all of the data and took responsibility for the integrity of the data. YJ was responsible for accuracy of the data analysis. All authors read and approved the final manuscript.

References

- [1] Fite RO, Mohammedamin A, Abebe TW. Unintended pregnancy and associated factors among pregnant women in Arsi Negele Woreda, West Arsi Zone, Ethiopia. *BMC Res Note* 2018;11:671. <https://doi.org/10.1186/s13104-018-3778-7>
- [2] Everett BG, McCabe KF, Hughes TL. Sexual orientation disparities in mistimed and unwanted pregnancy among adult women. *Perspect Sex Reprod Health* 2017;49:157-65. <https://doi.org/10.1363/psrh.12032>
- [3] Misgav R, Limor L, Shir D, Ron K, Noam S, Zvi V. Unintended pregnancies among women serving in the Israeli military. *Contraception* 2017;96:62-5. <https://doi.org/10.1016/j.contraception.2017.03.006>
- [4] Bishwajit G, Tang S, Yaya S, Feng Z. Unmet need for contraception and its association with unintended pregnancy in Bangladesh. *BMC Pregnancy Childbirth* 2017;17:186. <https://doi.org/10.1186/s12884-017-1379-4>
- [5] Nyarko SH. Unintended Pregnancy among pregnant women in Ghana: prevalence and predictors. *J Pregnancy* 2019;2019:8. <https://doi.org/10.1155/2019/2920491>
- [6] Herzog AG, Mandle HB, MacEachern DB. Association of unintended pregnancy with spontaneous fetal loss in women with epilepsy: findings of the epilepsy birth control registry. *JAMA Neurology*. 2019;76(1):50-5. doi:10.1001/jamaneurol.2018.3089
- [7] Dott M, Rasmussen SA, Hogue CJ, Reefhuis J. Association between pregnancy intention and reproductive-health related behaviors before and after pregnancy recognition, National Birth Defects Prevention Study, 1997-2002. *Matern Child Health J* 2010;14:373-81. <https://doi.org/10.1007/s10995-009-0458-1>
- [8] Kost K, Lindberg L. Pregnancy intentions, maternal behaviors, and infant health: investigating relationships with new measures and propensity score analysis. *Demography* 2015;52:83-111. <https://doi.org/10.1001/jamaneurol.2018.3089>
- [9] Tsegaye AT, Mengistu M, Shimeka A. Prevalence of unintended pregnancy and associated factors among married women in west Belessa Woreda, Northwest Ethiopia, 2016. *Reprod Health* 2018;15:201. <https://doi.org/10.1186/s12978-018-0649-6>
- [10] Dibaba Y, Fantahun M, Hindin MJ. The association of unwanted pregnancy and social support with depressive symptoms in pregnancy: evidence from rural Southwestern Ethiopia. *BMC Pregnancy Childbirth* 2013;13:135. <https://doi.org/10.1186/1471-2393-13-135>
- [11] Abajobir AA, Maravilla JC, Alati R, Najman JM. A systematic review and meta-analysis of the association between unintended pregnancy and perinatal depression. *J Affect Disord* 2016;192:56-63. <https://doi.org/10.1016/j.jad.2015.12.008>
- [12] Rallis S, Skouteris H, McCabe M, Milgrom J. A prospective examination of depression, anxiety and stress throughout pregnancy. *Women Birth* 2014;27:e36-e42. <https://doi.org/10.1016/j.wombi.2014.08.002>
- [13] Song Y, Lindquist R. Effects of mindfulness-based stress reduction on depression, anxiety, stress and mindfulness in Korean nursing students. *Nurse Educ Today* 2015;35:86-90. <https://doi.org/10.1016/j.nedt.2014.06.010>
- [14] Geng F, Liu X, Liang Y, Shi X, Chen S, Fan F. Prospective associations between sleep problems and subtypes of anxiety

- symptoms among disaster-exposed adolescents. *Psychol Health* 2018;50:7-13. <https://doi.org/10.1016/j.sleep.2018.05.017>
- [15] Nelson DB, Lepore SJ. The role of stress, depression, and violence on unintended pregnancy among young urban women. *J Womens Health* 2013;22:673-80. <https://doi.org/10.1089/jwh.2012.4133>
- [16] Maxson P, Miranda ML. Pregnancy intention, demographic differences, and psychosocial health. *J Womens Health* 2011;20:1215-23. <https://doi.org/10.1089/jwh.2010.2379>
- [17] Christensen AL, Stuart EA, Perry DF, Le H-N. Unintended pregnancy and perinatal depression trajectories in low-income, high-risk Hispanic immigrants. *Prev Sci* 2011;12:289-99. <https://doi.org/10.1007/s11121-011-0213-x>
- [18] Bahk J, Yun S-C, Kim Y-m, Khang Y-H. Impact of unintended pregnancy on maternal mental health: a causal analysis using follow up data of the Panel Study on Korean Children (PSKC). *BMC Pregnancy Childbirth* 2015;15:85. <https://doi.org/10.1186/s12884-015-0505-4>
- [19] Van der Riet P, Rossiter R, Kirby D, Dluzewska T, Harmon C. Piloting a stress management and mindfulness program for undergraduate nursing students: student feedback and lessons learned. *Nurse Educ Today* 2015;35:44-9. <https://doi.org/10.1016/j.nedt.2014.05.003>
- [20] Dobkin PL, Zhao Q. Increased mindfulness - The active component of the mindfulness-based stress reduction program. *Complement Ther Clin Pract* 2011;17:22-7. <https://doi.org/10.1016/j.ctcp.2010.03.002>
- [21] Beddoe AE, Yang C-PP, Kennedy HP, Weiss SJ, Lee KA. The effects of mindfulness-based yoga during pregnancy on maternal psychological and physical distress. *Journal of Obstetric, Gynecologic & Neonatal Nursing* 2009;38:310-9. <https://doi.org/10.1111/j.1552-6909.2009.01023.x>
- [22] Guardino CM, Dunkel Schetter C, Bower JE, Lu MC, Smalley SL. Randomised controlled pilot trial of mindfulness training for stress reduction during pregnancy. *Psychology & health* 2014;29:334-49. <https://doi.org/10.1093/scan/nsu075>
- [23] Hosseini Shahidi L, Moghimian M, Tavakkoli Zadeh J. The comparison of depression in wanted and unwanted pregnancies. *J Gonabad Univ Med Sci Health Serv* 2002;8:90-5.
- [24] Guth S, Wood S, Ivanova M, Hudziak JJ. Mindfulness training in pregnancy, and postpartum internalizing symptoms. *JAA Child Adolesc Psychiatry* 2017;56:S180. <https://doi.org/10.1016/j.jaac.2017.09.09225>
- [25] Setterberg S, Nissen E, Jonas W, Niemi M. Perinatal stress, anxiety, and depression: effects of a MBCP intervention on mother-infant interaction. *Eur Psychiatry* 2017;41:S30-S1. <https://doi.org/10.1016/j.eurpsy.2017.01.149>
- [26] Li J, Long L, Liu Y, He W, Li M. Effects of a mindfulness-based intervention on fertility quality of life and pregnancy rates among women subjected to first in vitro fertilization treatment. *Behav Res Ther* 2016;77:96-104. <https://doi.org/10.1016/j.brat.2015.12.010>
- [27] Krusche A, Dymond M, Murphy SE, Crane C. Mindfulness for pregnancy: a randomised controlled study of online mindfulness during pregnancy. *Midwifery* 2018;65:51-7. <https://doi.org/10.1016/j.midw.2018.07.005>
- [28] Goodman JH, Guarino A, Chenausky K, Klein L, Prager J, Petersen R, Forget A, Freeman M. CALM Pregnancy: results of a pilot study of mindfulness-based cognitive therapy for perinatal anxiety. *Arch Womens Ment Health* 2014;17:373-87. <https://doi.org/10.1007/s00737-013-0402-7>
- [29] Nyklíček I, Truijens SE, Spek V, Pop VJ. Mindfulness skills during pregnancy: prospective associations with mother's mood and neonatal birth weight. *J Psychosom Res* 2018;107:14-9. <https://doi.org/10.1016/j.jpsychores.2018.01.012>
- [30] Hicks LM, Dayton CJ, Victor BG. Depressive and trauma symptoms in expectant, risk-exposed, mothers and fathers: is mindfulness a buffer? *J Affect Disord* 2018;238:179-86. <https://doi.org/10.1016/j.jad.2018.05.044>

Received on July 20, 2020. Accepted on February 22, 2021.

Correspondence: Katayoun Alidousti Shahraki, Midwifery Department, Razi Faculty of Nursing and Midwifery, Kerman University of Medical Sciences, Iran - Tel.: 09132421749 - Fax: 03431325218 - E-mail: alidoosti@kmu.ac.ir - kalidousti@gmail.com

How to cite this article: Nejad FK, Shahraki KA, Nejad PS, Moghaddam NK, Jahani Y, Divsalar P. The influence of mindfulness-based stress reduction (MBSR) on stress, anxiety and depression due to unwanted pregnancy: a randomized clinical trial. *J Prev Med Hyg* 2021;62:E82-E88. <https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1691>

© Copyright by Pacini Editore Srl, Pisa, Italy

This is an open access article distributed in accordance with the CC-BY-NC-ND (Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International) license. The article can be used by giving appropriate credit and mentioning the license, but only for non-commercial purposes and only in the original version. For further information: <https://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>