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The Efficacy of Self-hypnosis on Sleep Quality in the Third Trimester of Pregnancy in Primiparous Women: A Randomized Clinical Trial

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ABSTRACT

Background & aim: Sleep quality disorder is one of the most common problems during pregnancy and is associated with many consequences for mother and infant. Based on the evidence, hypnosis can improve sleep quality by reducing nervous excitability, reducing mental stress, and decreasing physical discomfort. Therefore, the current study was conducted to examine the efficacy of self-hypnosis on sleep quality in the third trimester of pregnancy in primiparous women.

Methods: This randomized clinical trial was conducted on 60 primiparous women with a gestational age of 28-32 weeks using the block randomization in two hospitals and health centers of Shahid Beheshti University of Medical Sciences, Tehran, Iran. The subjects completed the demographic questionnaire, Pittsburgh Sleep Quality Index (2), Obstructive Sleep Apnea Questionnaire, Restless Legs Syndrome Questionnaire, and Depression, Anxiety and Stress Scale–21 (3). The intervention group received three 60-minutes sessions of self-hypnosis training by the researcher as weekly for three weeks. The control group received routine care. At baseline and one week after the end of the intervention, PSQI was completed. Data analysis was done by SPSS software (version 16) using statistical tests of independent and paired t test, Mann-Whitney, and Wilcoxon.

Results: The total score of sleep quality in the intervention group decreased by 2.6 ± 2.3 and increased by 0.7 ± 1.4 in the control group (P<0.001).

Conclusion: Self-hypnosis is effective on the sleep quality of pregnant women; this intervention can be used to improve the sleep quality of pregnant women.

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Introduction

Pregnancy is an important event in women's lives. There are many physiological and psychological changes during pregnancy that despite the pleasant feeling of becoming a mother, sometimes are accompanied by unstable psychological changes (4). In different periods of pregnancy, the duration and quality of sleep are different (5). Change in women's sleep pattern starts from the 12th week of pregnancy and continues until 2 months after delivery, with sleep disorders in the form of frequent awakenings and reduced night sleep (6). Sleep quality disorder is one of the most common problems during pregnancy (7). Since

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the time of Hippocrates, sleep disorders during pregnancy have been considered (8).

National Sleep Foundation survey revealed that more than 79% of pregnant women in the world suffer from sleep disorders (9). In the study of Taskiran (2011) in Turkey, it was reported that 84% of pregnant women had sleep disorders (10). In the study of Zaky (2015) in Greece, 88.89% of pregnant women in the third trimester had unfavorable sleep quality (11). In Iran, it has been reported that the quality of pregnancy sleep has decreased by 88% (12).

Changes in sleep patterns and sleep disorders in the first trimester of pregnancy are 13-80% and in the third trimester reported as 66-97% (9). Most sleep disorder and decrease in sleep quality during pregnancy is experienced by pregnant mothers in the third trimester and closer to the end of pregnancy (13). Physical factors causing changes in sleep quality in the first trimester include nausea and vomiting, back pain, frequent urination, fatigue, and in the second trimester, fetal movement, heartburn, and in the third trimester, pressure caused by fetal growth, frequent urination, bedwetting, back pain, pelvic pain, uterine contractions, shortness of breath, gastroesophageal reflux, cramps, and skin itching. Spiritual, psychological, and emotional factors such as fear of taking care of the infant and accepting the role of motherhood throughout pregnancy can cause changes in the quality of sleep (14).

Unfavorable sleep quality due to changes in the immune system, such as changes in the level of cytokines, leads to adverse maternal and fetal outcomes, which include glucose intolerance and high serum glucose, preeclampsia, depression, daily dysfunction, maternal fatigue, increased anxiety, decreased tolerance against pain, decrease in acceptance of mother's role, premature delivery, low birth weight, increase in length of labor stages and increased rate of caesarean section (12, 15-16).

The findings of the research by Wangel et al. (2011) indicated that insufficient sleep increases the risk of emergency cesarean by 1.57 times (17). The results of the study by Lee et al. (2004) showed that women who sleep less than 6 hours are more likely to undergo a cesarean section and have a longer process of natural childbirth (18). Also, Reutrakul and colleagues (2011) indicated that sleep disorders are associated with an increased risk of gestational diabetes and adverse outcomes (19). Jahan Pak et al. (2012) showed that there is a relationship between sleep duration and gestational diabetes, and decreasing sleep duration during pregnancy increases the probability of diabetes and glucose tolerance disorder (15).

Also, the unfavorable sleep quality at the end of pregnancy, especially in the third trimester, in addition to the maternal and fetal complications mentioned above, causes a decrease in emotional control, an increase in the symptoms of prenatal depression, depression in the first weeks after childbirth, and grief after childbirth (20, 21). Hong et al. (2019) conducted a study in Taiwan and found a significant relationship between the Pittsburgh Questionnaire scores and the symptoms of depression three weeks after delivery (22). Moreover, Alipour et al. (2012) and Parsai Rad et al. (2011) also reported that poor sleep quality is a predisposing factor for postpartum depression and increases its chance by four times (23).

So far, several studies have been conducted to improve sleep quality during pregnancy (24). Due to the adverse effects of reduced quality of sleep during pregnancy, pharmacological and non-pharmacological methods are used to improve sleep quality. Although pharmacological methods may lead to an increase in sleep duration in the short term, they are not suitable method due to side effects, such as drug dependence, increased drug tolerance, and decreased sleep quality (4).

Also, pharmacological treatments during pregnancy have serious risks for the mother and fetus, and their use is prohibited throughout pregnancy (4). Hypnosis is one of the psychological interventions used in many different fields, including obstetrics and gynecology (25). Hypnosis is an altered state of consciousness with three components increased concentration (absorption), dissociation, and increased suggestibility (26). According to Kaplan and Sadocks, hypnosis is a psychotherapeutic method that by changing the state of consciousness and using three components of absorption, association, and

suggestibility, puts the audience in a situation where the process of hypnosis can be performed on the subject (hypnotized)(27).

Self-hypnosis is also a type of hypnosis in which the therapist teaches the subject how to change his level of consciousness and enter the hypnosis phase (28). In a retrospective study, Ran et al. (2006) investigated the effect of self-hypnosis on sleep disorders in school-aged children and showed that self-hypnosis was effective in reducing sleep disorders (29). Kohen et al. (1992) implied that self-hypnosis was effective in improving children's sleep disorders (30). Hurwitz and colleagues (1991) reported that hypnosis exercises at home were 74% effective in improving sleep disorders(31). In the research of Mohammadzadeh Ebrahimi et al. (2017), one of the methods of using hypnosis and self-hypnosis is in the field of sleep. The results indicated that hypnotherapy is effective in improving the overall sleep quality and dimensions of mental sleep quality, delay in sleep, sleep disorders, and daily dysfunction (32).

It is notable that decrease in mental and emotional peace caused by insomnia leads to the inefficiency of caring for the newlyborn child and the negative impact on the family which indirectly leads to imposing an economic burden on the society. On the other hand, providing the physical and mental health of mothers is of special importance in prenatal care. Since the effect of self-hypnosis in improving sleep quality has been shown in studies and no study has reported the efficacy of self-hypnosis on the quality of sleep during pregnancy so far, the current research was performed to examine the efficacy of self-hypnosis on sleep quality in third trimester in primiparous women.

Materials and Methods

This randomized clinical trial was performed to investigate the efficacy of self-hypnosis on sleep quality in the third trimester in 60 primiparous women with gestational age of 28-32 weeks in two educational and therapeutic centers of Shahid Beheshti University of Medical Sciences, Tehran, Iran. This project was registered in Iranian Registryof Clinical Trial (IRCT) under code of IRCT20191206045630N2.

After obtaining the necessary permissions , according to the number of referrals and having an obstetric clinic, geographical location, and a suitable environment for holding meetings, two centers were selected from the hospitals and health centers of Shahid Beheshti University of Medical Sciences in Tehran.

To prevent information dissemination and blinding, time block randomization was used as sampling method, so that certain days were assigned to the control and intervention groups. Random selection of days was done by random allocation through using a lottery. Sheets with the contents of even and odd days, and intervention and control group were placed in two bags. Then the papers were taken out from both bags, thus the even days were assigned to the intervention group, and the odd days to the control group. Conveniene sampling was used to select each participant at the predetermind day.

Inclusion criteria were: Iranian women who live in Tehran, with ability to read and write, age range of 18 to 35 years, gestational age of 28 to 32 weeks, primiparity, having singleton and wanted pregnancy, no speech or hearing problems,not using alcohol, drugs and smoking. Also, obtaining a score of 5 or higher from the Pittsburgh Sleep Quality Questionnaire (PSQI), obtaining a score of less than 4 from the Restless Leg Syndrome Questionnaire, getting a score of 0-2 from the Obstructive Sleep Apnea Questionnaire, obtaining the score of depression less than 21, anxiety less than 15 and stress less than 26 from the Depression, Anxiety and Stress Scale–21 (DASS 21). Additionally, body mass index < 30 kg/m^2, no medical disease, no obstetric problems, no mental illness and history of drug use, no night shift work, no major accident during the previous 6 months were other inclusion criteria.

Exclusion criteria were: no tendency to continue the study, participating in a class or other educational program related to sleep, childbirth during the study, obstetric problems or complications, intrauterine growth restriction, fetal abnormalities, premature uterine contractions, bleeding, increased pressure in pregnancy, pre-eclampsia and eclampsia, travel or change of location, hospitalization, not participating in one of the self-hypnosis sessions, and performing self-hypnosis less than 80% of the time specified in

the checklist (practice 28 times from a total of 36 exercises).

The study tools included the standard Petersburg sleep quality index (PSQI), demographic questionnaire, assessment of Restless Leg Syndrome Questionnaire, Obstructive Sleep Apnea Questionnaire, and Depression, Anxiety and Stress Scale–21 (DASS-21). Pittsburgh.

The (PSQI) is an international standard tool for assessing the sleep quality of the last month in each trimester of pregnancy (33). The questionnaire was first designed by Buysse et al. in 1988 to assess sleep quality and was used in clinical research; it is also suitable for assessing sleep quality during pregnancy (33). This questionnaire includes 19 self-report sections and 7 components of subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction.

The scoring of each dimension is based on 0 to 3. The total score of this questionnaire is 0 to 21. A total score greater than or equal to 5 indicates poor sleep quality. The time to complete the questionnaire is 5-10 minutes and the scoring time is 5 minutes (33). Jalal Marvi et al. (2018) confirmed the reliability of the Persian version of the questionnaire, achieving a Cronbach's alpha coefficient of 0.75 (34). The Cronbach's alpha coefficient of 0.74 in this study confirmed the reliability of the questionnaire. The Depression, Anxiety and Stress Scale–21 (DASS-21) is a self-assessment tool that includes 21 questions and three equal parts related to each of the investigated indicators. Each question has a four-point Likert scale between zero and three. (0 = never, 1 = low, 2 = moderate, 3 = very high). This scale includes three self-report scales to measure depression, anxiety, and stress states. Each of these three scales contains 7 items that are divided into subscales with similar content. The reliability of this questionnaire was confirmed in the study of Beevi et al. (2016) by the internal consistency method with an overall Cronbach's alpha coefficient of 0.93 (depression 0.88, anxiety 0.82, and stress 0.90) (35). In this study, the reliability was confirmed by Cronbach's alpha coefficient of 0.81.

The Restless Leg Syndrome Questionnaire has 4 questions in the field of unpleasant and irritating feeling in the legs that make the person walk and move the legs, appearance or exacerbation of symptoms while resting, lying in bed and sitting, complete or partial recovery of the feeling by moving legs, and worsening of unpleasant symptoms at sunset or night, that screen the possibility of restless leg syndrome with never, sometimes, mostly and always. Scoring is from 0 to 3 and the resulting score is between 0 and 12, a score less than 4 is no syndrome, a score of 4-8 is a mild syndrome, and a score of 8-12 is a severe syndrome (36). The reliability of this tool has been confirmed by Farajzadeh et al. (2016) with a Cronbach's alpha coefficient of 0.75 (37). In this study, the reliability was confirmed by Cronbach's alpha coefficient of 0.76.

Obstructive Sleep Apnea Questionnaire: This questionnaire contains 4 questions about the history of frequent loud snoring during sleep, daytime sleepiness, breathing interruption during sleep, and history of high blood pressure, which screen the possibility of obstructive sleep apnea as yes (1), and no (0). The range of scores is 0-4, and a score of 3 or more indicates a high risk of obstructive sleep apnea and a score of less than 3 indicates a lower risk of obstructive sleep apnea (38). The reliability of this tool has been confirmed by Chung et al. (2008) with Cronbach's alpha coefficient (38). In the current research, the reliability of this questionnaire was determined through Cronbach's alpha in the case of 10 participants.

In this research, 72 eligible pregnant women were included. In the intervention group, three subjects due to preterm delivery, two due to unwillingness to continue the study, one due to not doing the exercises, and in the control group, four due to preterm delivery, one due to high-risk pregnancy (pre-eclampsia) and one due to lack of access to the participants) were excluded from the study, and finally, the information of 60 pregnant women was examined(Figure 1). In addition to routine care, the intervention group received three training sessions of self-hypnosis by the researcher for 60 minutes weekly for three weeks (39).

After obtaining consent and explaining the study process, the questionnaires were

completed by the people in the form of self-report within thirty minutes . The standard PSQI was again completed one weeks after the intervention,

In the first session, after getting to know mothers, it was explained about hypnosis and self-hypnosis, their use in pregnancy, the benefits of hypnosis, and the method of doing it, and their questions were answered. Then the dialogues based on the technique of progressive muscle relaxation with a naturalistic approach, including induction of body and mind relaxation, which starts from one point and systematically reaches another point, was provided, and the audio was recorded and given to the mothers at the end of the first session (40-41). The second session included the induction of joyful images of the childern and the image of mothers playing with their children in the future.

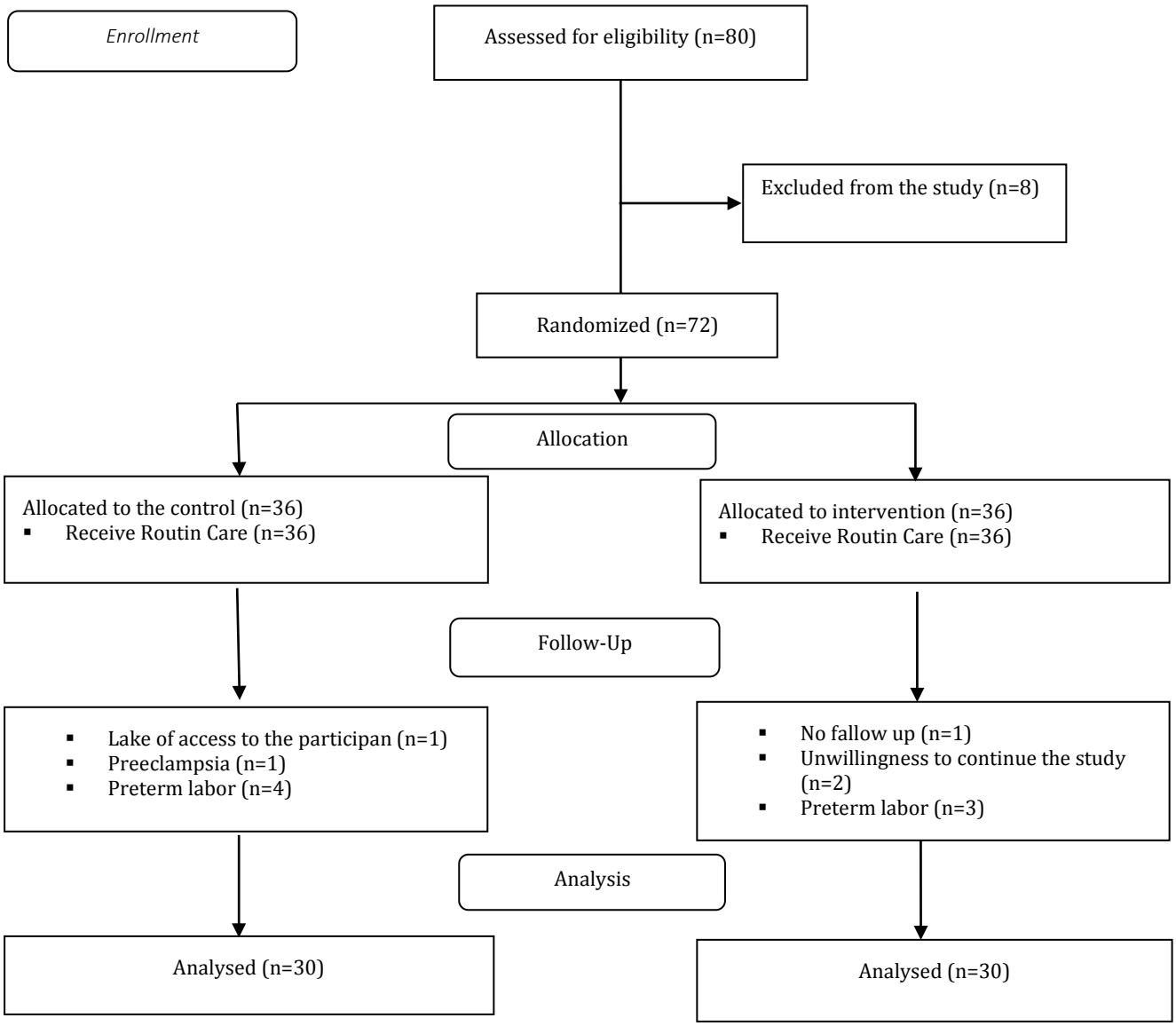

Figure 1. Consort Flow Diagram

The third session concentrated on conditioning and creating relaxation to alleviate symptoms. and the content of the third session included the conditioning of the created relaxation in order to relieve the symptoms (42).

During the interview with the mothers, their interests and mental commonalities were investigated and the visualization of the people was done based on their interests.

The researcher, under the supervision of the consultant professor, recorded an audio file lasting 15-20 minutes, featuring dialogues focused on body relaxation, peace of mind, and deep sleep. The file was provided to the mothers to listen and practice the recorded voice every day at noon and night (40-41). At the beginning of the second session, problems were fixed and questions were answered. The mothers received the researcher's contact number so they could call for any questions. A daily self-hypnosis checklist was given to the mothers, so that after performing self-hypnosis, the checklist should be completed daily, and the weekly follow-up was performed between the sessions through phone calls. One week after the end of the intervention, the Pittsburgh sleep quality questionnaire was again measured in the two groups.

The exclusion criteria were checked during the study, and if participants met the exclusion criteria, they were excluded from the study .

Data were analyzed by SPSS software (version 16) and Shapiro-Wilk tests، independent t test, Mann-Whitney, paired t test, and Wilcoxon.

Results

The mean age of the studied women in the intervention group was 23.9 ± 2.8 years and in the control group was 24.0 ± 3.2 years. Also, 43.3% in the intervention group and 40.0% in the control group had a diploma education. Other demographic characteristics in the two intervention and control groups were not significantly different, that is, the two groups were homogeneous (P>0.05) (Table 1).

Table 1. Frequency distribution of demographic characteristics in the intervention and control groups

Variable	Intervention Mean±SD	Control Mean±SD	Test result
Age (years)	23.9±2.88	24.0±3.2	P=0.97, Z=0.0
BMI	24.6±2.8	23.9±3.2	t=0.9 ، df=58.0 P=0.393
Gestational age	29.9±1.3	30.2±1.0	t=0.7 ، df=58.0 P=0.472
	N (%)	**N (%)**	
Education			، df=2.0
Less than diploma	10 (33.3)	9 (30.0)	Chi2=0.3
Diploma	13 (43.3)	12 (40.0)	P=0.843
Bachelor	7 (23.3)	9 (30.0)	
job			
Employee	0 (0.0)	3 (10.0)	
Household	27 (90.0)	26 (86.7)	P=0.176
Student	1 (3.3)	1 (3.3)	
Free	2 (6.7)	0 (0/0)	

Before the intervention, the mean of the total sleep quality score of the studied women in the intervention group was 9.4 ± 3.3 and in the control group was 9.4 ± 2.7, which was not a significant difference (P=0.743).

After the intervention, the mean of the total sleep quality score of the studied women in the intervention group was 6.7 ± 2.5 and in the control group was 10.1 ± 2.9. The independent t-test revealed this difference to be significant (P<0.001). The total sleep quality score of the studied women after the intervention compared to before the intervention decreased by 2.6 ± 2.3 in the intervention group and 0.7 ± 1.4 in the control group. The Mann-Whitney test showed this difference to be significant (P<0.001). In the

intragroup comparison, the Wilcoxon test indicated that in the intervention group, the score after the intervention was significantly lower than before the intervention (P<0.001), but in the control group, the score after the intervention was significantly higher than before the intervention (P=0.014) (Table 2). Independent t-test was used to compare two groups in terms of normal quantitative variables, and the Mann-Whitney test was used for non-normal quantitative variables and rank variables.

Table 2. Comparison of the mean score of overall sleep quality before and after the intervention in the two groups

The total score of sleep quality	Group		Test result
	intervention	Control	
	Mean±SD Median (first quartile, third quartile)	Mean±SD Median (first quartile, third quartile)	
Before intervention	9.4±3.3 9.0 (7.0,10.5)	9.4 ±2.7 9.0 (7.0,11.0)	Z=-0.3 P=0.743
After intervention	6.7±2.5 6.5 (4.5,8.0)	10.1±2.9 9.5 (8.0, 12.5)	t=-4.8 ، df=58.0 P<0.001
Difference before and after intervention	-2.6±2.3 -3.0 (-4.0,2.0)	0.7±1.4 1.0 (0.0,1.0)	Z=5.5 P<0.001
Intragroup test result	Z=4.1 P<0.001 Wilcoxon	Z=-2.4 P=0.014 Wilcoxon	

Discussion

The present study was conducted to determine the the efficacy of self-hypnosis on sleep quality in the third trimester of pregnancy in primiparous women. The findings of the current research indicated that self-hypnosis had an effect on sleep quality in the third trimester of pregnancy in primiparous women, which confirms the research hypothesis. Klumbach et al. (2020) in their study to examine the effect of digital cognitive behavioral therapy on insomnia in pregnant women reported observational evidence that cognitive behavioral therapy is effective for improving sleep during pregnancy and also has long-term benefits for the postpartum period. Hypnosis is one of the psychological interventions used in many different fields, including obstetrics and gynecology (25). Since digital cognitive behavioral therapy, like hypnosis, is a cognitive behavioral method, it seems that sleep problems with an increase in nervous and mental excitability are related to an increase in the activity of the sympathetic nervous system.

In addition, it seems that primary insomnia may occur due to the activity of the sympathetic nervous system caused by disorder in the secretion of cortisol in the body. Hypnosis improves the quality of people's sleep through mechanisms such as reducing physiological arousal, inducing relaxation, releasing tension, and cognitive changes (32), reducing nervous excitability and mental stress, and reducing physical discomfort (43), which is consistent with the present study. Ran et al. (2006) in their study to examine the effect of "hypnosis for the treatment of insomnia in school-aged children" reported that the use of hypnosis was effective in the treatment of insomnia in school-aged children (29), which is consistent with the present study.

The results of study by Shojaei et al. (2015) to assess the efficacy of relaxation exercises on the general health and sleep quality of pregnant women showed that relaxation exercises were effective on sleep quality (44). Insomnia is one of the important disorders and a threatening phenomenon for the health of the body, which is caused in response to internal or external stimuli. Relaxation is one of the recommended measures to improve sleep disorders. Relaxation methods are also known to be effective in many situations such as pain, childbirth, anxiety, and insomnia. It facilitates falling asleep and reduces mental and physical tensions. In the present study, the relaxation

method was used in one of the self-hypnosis sessions. Their findings are in accordance with the results of the current research.

Schafer et al. (2013) in their study to determine the effect of guided imagery on improving the sleep quality of pregnant mothers reported that performing mental imagery and relaxation in pregnant mothers has led to improved sleep quality and reduced stress and anxiety, which is consistent with the present study (45). Mental imagery is one of the types of mental interventions. This method involves mental exercises designed to mentally accept the influence of health and healing in the body and to use the imagination to create sights, sounds, smells, tastes, or other sensations. This technique involves visualizing a specific desired image or goal. Since the visualization method was used in the present study in self-hypnosis, their study is in accordance with the findings of the current research.

Jalal Marvi et al. (2019) in their study on "comparing the effect of education based on continuous care model and remote care (telehealth) on sleep quality in pregnant women" reported that sleep quality decreases and sleep disorders increase with the passage of time during pregnancy (34). An increase in the concentration of progesterone, which is one of the sleep homeostasis hormones, causes changes in the sleep pattern during pregnancy (7). Continuous care models and remote care, such as self-hypnosis, are considered self-care methods. The current study examined the sleep quality of both the control and intervention groups, revealing a decrease in the control group's sleep quality during pregnancy and an increase in the sleep quality of intervention group, which aligns with the findings of study by Jalal Maravi(46).

Graham et al. (1975) in their study with the aim of comparing the effect of hypnosis and relaxation on insomnia, reported that relaxation was effective on insomnia, but no difference was observed in hypnosis intervention (47), which is not in accordance with the findings of the current research. In their study the participants were students, but in the current study, the participants were pregnant women, and these two groups are different in terms of sleep disorder mechanisms. Also, the sample size in study by Grahamet al. was smaller (22 subjects), but in the present study, 60 pregnant women were investigated.

Due to the nature of intervention, which was a self practice, the limitations of this research include non-confirmation of sleep disorders objectively; individual, cultural, mental, and psychological differences and differences in response conditions of participants, and lack of strict control of participants in receiving other services to improve sleep quality. The researcher couldc not accurately control self-hypnosis, as it was a personal practice, although phone calls and a checklist used for monitoring the right practice. In addition, the individual and genetic differences of people are factors affecting sleep quality, which are beyond the researcher's control. Also, sleep quality is a subjective process, and it is beyond the researcher's responsibility to control all the factors that affect it. It is recommended for future research to investigate the effect of self-hypnosis on anxiety and fear in pregnant women with sleep disorders and comparison of the effect of self-hypnosis in all trimesters of pregnancy.

Conclusion

The results of the current study indicated that self-hypnosis can affect the sleep quality of pregnant women. Given the beneficial impact of self-hypnosis on pregnant women's sleep quality, we can recommend this intervention to pregnant women to enhance their sleep quality by instructing them self-hypnosis. Health professionals who provide care for pregnant women and has taken a self-hypnosis course can assist women by using this technique to enhance the quality of their sleep.

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Conflicts of interest

Authors declared no conflicts of interest.

Ethical considerations

Participation was voluntary. The confidentiality of data was guaranteed. The informed consent was obtained from the research subjects.

Ethical approval

The study was approved by the Ethics Committee of the Mashhad University of Medical Sciences, Mashhad, Iran under code of IRCT20191206045630N2.

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Authors' contribution

B. KH. M. was a MSc student, supervised by M. T.. M. F and S. R. M. contributed substantially in the study design. B. KH. M and M.T. carried out the data collection. B. KH. M., M.T and S. R. M. conducted data analysis and interpretation. B. KH. M. and M.T. provided the first draft of the manuscript. All authors have reviewed the manuscript critically. All authors read and approved the final version of the manuscript**.**

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