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Effect of Non-Pharmacological Interventions on Sleep Quality during Pregnancy among Primigravida

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Abstract: *Decreased sleep quality is a common complaint during pregnancy especially among primigravida. Regarding the high incidence of sleep disorders during pregnancy and their adverse effects on maternal and fetal health, it is hazardous to apply pharmaceutical approaches during pregnancy. Relaxation and guided imagery are forms of the non-pharmacological treatments for managing sleep disorders.*

Aim of the study: *was to study the effect of non-pharmacological interventions on sleep quality during pregnancy among primigravida.*

Methods: Research Design: *a quasi experimental design was used in this study with comparing three groups two study and one control.*

Subjects: *A purposive sample of one hundred and twenty women was recruited*

Tools: *three tools were used for data collection which named; interviewing questionnaire, Pittsburgh Sleep Quality Index and an evaluation checklist.*

Results: *there was a statistically significant difference between groups regarding daily sleep time, PSQI score and sleep quality after intervention.*

Conclusion: *the first research hypothesis was accepted as it was found that progressive muscle relaxation 'as one of the non-pharmacological interventions' was effective in improving participants sleep quality.*

Recommendations: *Instruct pregnant women about appropriate non-pharmacological interventions which have no side-effects to improve sleep quality.*

Keywords: *Guided Imagery, Muscle Relaxation, Primigravida, Sleep quality*

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I. Introduction

1.1 Operational Definitions

Non-Pharmacological Interventions: referring to therapy that does not involve drugs. In this study it referred to progressive muscle relaxation and guided imagery as ways of improving sleep quality.[1]

Progressive Muscle Relaxation: it is one of the nursing interventions to release muscle tension it is a method of deep muscle relaxation based on the premise that muscle tension is the body's physiological response to anxiety- provoking thoughts and that muscle relaxation blocks anxiety. [2]

Guided Imagery: is the use of relaxation and mental visualization to improve mood and/or physical well-being. [3]

Sleep Quality: it can be measured from two perspectives either subjective or objective sleep quality. In this study subjective sleep quality will be tested it is defined as one's perception that they fall asleep easily, get sufficient duration so as to wake up feeling rested, and can make it through their day without experiencing excessive daytime sleepiness. **Objective sleep quality** is defined by sufficient duration (> 7hrs), high efficiency (> 85%), and low fragmentation (< 25). Using polysomnography "PSG" allows us to add sleep architecture to the equation, whereby "Good" **objective sleep quality** is defined not only by sufficient duration, high efficiency, and low fragmentation, but also by proper staging of sleep (i.e., cycling through non-REM "rapid eye movement" (stages 1-4) and REM).[4]

Pregnancy: pregnancy or gestation is the state of carrying a developing embryo or fetus within the female body lasting for 9 months. Late pregnancy is the last 3 months of gestation. [5]

Primigravida: it is a term that describes a woman who is pregnant for the first time. [5]

Sleep is one of the basic human needs, according to Maslow's hierarchy of needs, and it may be the most import ant[6].Due to hormonal changes that occur during menstruation, childbirth, and also menopause, sleep disorders are reported to be more common in women than men during the course of life [7].

Pregnancy is one of the underlying causes of sleep disturbances [8].

Diminished sleep quality is one of the common complaints of pregnancy reported in many studies by pregnant w omen[9]. Such complaint occurs mostly in the third trimester of pregnancy as the mother approaches the end of pregnancy, according to the same reference.The frequency of sleep disorders has been documented over the past few decades 75% in the third trimester

[10].Several studies have indicated that poor sleep quality may lead directly to premature labor, low birth weight, blood pressure disorders, glucose sensitivity and depression during and after delivery. [11], [12], [13], [14] and [15]. The most widely used sleep disorder rehabilitation approaches are drug therapies in which the central nervous system suppression, depression and stress levels decrease and the pregnant woman is hypnotic and relaxed[16]. Due to some potential risks to the growing fetus and their effects on fetal development, pharmaceutical methods may be highly contraindicated during pregnancy Behavioral therapy is one of the non-pharmaceutical approaches that are commonly used to treat sleep problems. Relaxation as one of this therapy can relieve external stressors and has been widely applied in recent years. It is considered to be a simple, feasible and useful approach to behavior that nurses around the world use to manage sleep disorders[18],[19] and[20]. Specific relaxation techniques are available such as incremental muscle relaxation, guided imaging, massage, hypnotism, meditation, music therapy, and breathing techniques[12]. Progressive muscle relaxation is a commonly used technique; it has been demonstrated that this approach is effective in reducing cognitive and physical pressure and enhancing self-confidence[19] and[21]. As stated in their study by [22], controlled imaging could reduce stress and increase participants ' emotional stability[22].Different techniques of relaxation can affect different biological and emotional stressors.However, little research has been done to determine which method is most effective in the management of sleep disorders during pregnancy[18].Progressive muscle relaxation techniques include full-body relaxation, color transfer, offering a color and reducing pain and listening to restful music or meditative sounds In many situations where people are nervous, painful, highly stressed, or anxious, these strategies are beneficial. They may be helpful in treating asthma, hyperventilation, high blood pressure, disease of Raynaud, headache, and peptic ulcers[8]. Pregnancy for any woman is a stressful event. During the third trimester of pregnancy and near delivery time, the stress rate greatly increases. Stress, in fact, is an essential cause of poor quality of sleep and other sleep disorders[18].[23] 23] developed strategies to enhance sleep quality such as progressive muscle relaxation to decrease somatic stress and directed visualization, as well as meditation to eliminate distractive dreaming thoughts[23]. 24] In the third trimester of pregnancy, progressive muscle relaxation has been reported to play a role in improving sleep disorders[24]. The fundamental principle of progressive relaxation of the muscle is the sitting posture of the female. The head must be positioned along the trunk in other words, the vertebral column must be straight, and the curves must be filled. Simply using one's imagination to promote mental and physical health is guided imagery. It can be self-directed, where the person places himself in a relaxed state, making his own images or being guided by others. An person listens to a psychologist, video, or audiotaped exercise when guided by others, which takes him through a calming and imaging exercise. Several psychologists are also using The first element is to achieve deep relaxation through breathing techniques and muscle relaxation. The person closes his eyes during the relaxation process and focuses on the slow, in and out breathing sensation. Alternatively, she could concentrate on removing the stress feelings from her muscles, beginning with the toes and moving up to the top of the head. Tapes for relaxation also feature The second element of the exercise, when total relaxation is reached, is the imagination or visualization itself. There are a number of different types of techniques for guided imagery, limited only by imagination. Many forms widely used include imagery for relaxation, imagery for recovery, imagery for pain control, and mental rehearsal[11]. The above-mentioned sitting position without displacement is probably not easy for any woman during pregnancy and with the enlargement of the abdomen, and the supine position could easily push the uterine vessels[17],[18],[19] and[20]. Guided imagery seems to be of major priority since it does not require a specific sitting position and can be performed simply in a limited amount of time[18]. In a study conducted by[26] mental imaging, participants with post-traumatic stress disorders, nightmares and sleep disorders[26] were a well-tolerated method. In addition,[27] showed a significant link between mothers with premature neonates ' sleep quality and mental distress; as their results showed that sleep quality improved through controlled imaging[27]. All the same;[28] [29] showed that guided imaging led to lower heart rate and more relaxation compared to other techniques[29].

1.2 Significance of the Study:

Over the past few decades, the incidence of sleep disorders in the third trimester has been reported to be around 75%[10]. Several studies have reported that poor sleep quality may lead directly to early labor, low birth weight, blood pressure disorders, glucose tolerance disorders, and depression during and after pregnancy[11], [12],[13], [14], and[15]. Therefore, childbirth is a critical period.

1.3 Aim of the Study:
To study the effect of non-pharmacological interventions on sleep quality during pregnancy among primigravida
The specific study aims were to:
Examine the effect of progressive muscle relaxation on sleep quality during pregnancy among primigravida
Examine the effect of guided imagery on sleep quality during pregnancy among primigravida

1.4 Research Hypothesis:
Progressive muscle relaxation 'as one of the non-pharmacological interventions' will improve sleep quality during pregnancy among primigravida as compared to guided imagery.
Guided imagery 'as one of the non-pharmacological interventions' will improve sleep quality during pregnancy among primigravida as compared to progressive muscle relaxation.

II. Method

2.1 Research design:
A quasi experimental design was used in this study with comparing two study groups "guided imagery group and progressive muscle relaxation group" with the controlgroup.

2.2 Setting:
The study was conducted in two maternal and child health centers at shebin elkoom city, menofyia governorate. These settings were selected as the mentioned city is the governorate capital and known to have the highest populationdensity.

2.3 Subjects:
The study sample was assigned to three groups, comprised of 120 pregnant women. Participants were recruited according the following inclusion criteria:
1) primigravidity; 2) gestational age of 29-32 weeks; 3) singleton pregnancy; 4) low-risk pregnancy; 5) no history of infertility; 6) no prior history of mental or physical diseases; 7) literacy; 8) no stressful events within the last six months; 9) no treatments for sleep disorders before pregnancy and 10) no night shifts during the studyperiod.
The exclusion criteria were as follows: 1) unwillingness to continue participation in the study; 2) not performing relaxation exercises once a week; and 3) obstetric problems or stressful events during the study period.

2.4 The sample
The sample size was determined through the following procedure: Based on post-intervention values of sleep quality reported in [31] for the guided imagery group, 4.56±1.56 as an intervention group, 12.56±2.12 as a control group and in the progressive muscle relaxation group, 5.90±1.89 as an intervention group, the sample size was calculated to be 120 (40 for each group), considering CI=95% and power=90% (10% dropout).

2.5 Maneuver of Intervention
2.5.1 Preparatory Phase:
An extensive reviewing of electronic data related to sleep, sleep quality during pregnancy, guided imagery and progressive relaxation was done. A review of literature to collect relevant knowledge pertinent to study participants was also used in developing data collection instruments. Telephone number of each participant was taken for communication and for follow up. Participants were randomly assigned to the study groups (group1: guided imagery, group 2: progressive muscle relaxation and group 3: control group).

2.5.2 Operational Phase:
All participants of the study groups were interviewed three times; the first to explain study purpose, to obtain the oral informed consent and to plan time for other interviews. The second was a training one and done for each group alone. It was for the pre test, and to explain the required intervention through a PowerPoint presentation then educational films were also presented by the researchers. At the end of sessions, a booklet and a CD about the presented content were given to each group's participants for practicing at home. The training session was held for groups of 3-5 participants along two weeks (45-60 minutes per session). The last one was for the post-test and it was four weeks later.
Progressive muscle relaxation was instructed based on Jacobson's method by relaxing and contracting 8 muscle groups (modified for abdominal muscles in pregnancy). Guided imagery was instructed by encouraging positive feelings of peacefulness and safety and guiding individuals to imagine beautiful scenes. The subjects were asked to do the exercises twice a day (once in the morning and once before sleeping at night) for a period of 4 weeks and mark the exercise checklist. The researchers contacted the participants at the end of

the first, second, third, and fourth weeks and emphasized the importance of doing regularexercises.

2.5.3 Evaluation Phase:

After four weeks, the researchers evaluate the checklist for completeness. Sleep quality was assessed using PSQI in both groups, and the pre- and post-intervention results were compared. If the participants experienced other sleep disorders (such as apnea, nightmares, narcolepsy, and restlessness leg syndrome, or severe insomnia), they were referred to psychiatrists.

However, if the exercises were not performed correctly and the participants were willing to continue the study, the researchers repeated the training session and then start the four weeks period again.

The intended learning outcomes of the second session were:

Knowledge and understanding

List the importance of guided imagery/progressive muscle relaxation Recall the steps of guided imagery/progressive muscle relaxation Intellectual skills

Summarize the role of guided imagery/progressive muscle relaxation in improving sleep quality. General and transferable skills

Value the importance of guided imagery/progressive muscle relaxation in improving sleep quality during pregnancy.

Attitude

Communicate effectively with the researchers to correctly practice guided imagery/progressive muscle relaxation to improve sleepquality.

Session outline:

Pregnancy

Sleep and sleep hygiene

Non-pharmacological interventions to improve sleep quality

Guided imagery: technique and benefits/ progressive muscle relaxation: technique and benefits Teaching Materials

PowerPoint presentation Videos

2.6 Data Collection Instruments

Three tools were used for data collection which named; interviewing questionnaire, Pittsburgh Sleep Quality Index (PSQI) and an evaluationchecklist.

The interviewing questionnaire (*): Was used to evaluate sociodemographic data, obstetric and gynecological history and data about currentpregnancy.

The Pittsburgh Sleep Quality Index [30]**:** This is the gold standard measure of subjective sleep quality. This scale evaluates a person's attitude towards sleep quality in the last four weeks. It includes 9 questions in 7 components of subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleep medication, and daytime dysfunction. The items are scored using a Likert scale, ranging from 0 to 3 (3= the highest negative score). The total score was calculated by summing the scores of components, ranging from 0 to 21; scores ≥ 5 indicate poor sleep quality [30]. This tool was translated by the researchers intoArabic

Evaluation checklist (*): This tool was used to ensure performing the steps of each technique (either guided imagery or progressive relaxation).

(*)Tool was designed by the researchers and submitted to validity and reliability tests.

2.7 Validity

The validity of the instruments was ascertained by a group of subject areas experts, medical and nursing staff who reviewed the instruments for content validity. They were asked also to judge the items for completeness and clarity. Suggestions were incorporated into theinstruments.

2.8 Reliability

Test-retest reliability was applied by the researchers for testing the internal consistency of the instruments. It is the administration of the same instruments to the same participants under similar conditions on two or more occasions. Scores from repeated testing were compared.

2.9 Piloting the Instruments:

A Piloting was conducted on twelve women to test the applicability of the instruments and to estimate the time needed for data collection. On the basis of the piloting results the researchers determined the feasibility of data collection procedures, developed an interview schedule. The results of the piloting help in refining the interview questionnaire.

2.10 Ethical Consideration:

Official steps were taken to obtain a permission to conduct the study, with explanation of the aim and the

importance of the study to the centers authorities. An informed verbal consent was obtained from all women before participation in the study. Woman were assured that their information were confidential and only used for study process.

2.11 Statistical Data Analysis:

The data collected were tabulated & analyzed by SPSS (statistical package for the social science) software, statistical package version 20 on IBM compatible computer. Quantitative data were expressed as mean & standard deviation (X±SD). Paired t-test is a statistical technique used to compare two population means in the case of two samples that are correlated. Qualitative data were expressed as number and percentage (No & %) and analyzed by applying chi-square test. Analysis of variance (ANOVA) was used to analyze the differences among group means and their associated procedures. Kruskal-Wallis test was used to assess for significant differences on a continuous dependent variable by a grouping independent variable with the threegroups).

P-value at 0.05 was used to determine significance regarding: P-value > 0.05 to be statistically insignificant (NS), P-value ≤ 0.05 to be statistically significant (S) and P-value ≤ 0.001 to be high statistically significant (HS).

III. Results

Table 1: Sociodemographic data of the studied groups

Sociodemographic Data	**Group**			**Chi squaretest**	**P.value**
	Control	**Guided Imagery**	**Progressive Relaxation**		
Age					
< 20	10	11	10	0.65	>0.05
	25.0%	27.5%	25.0%		
21-30	25	23	26		
	62.5%	57.5%	65.0%		
31-40	5	6	4		
	12.5%	15.0%	10.0%		
Education					
Illiterate Secondary	10	12	8	5.9	>0.05
University	25.0%	30.0%	20.0%		
	20	19	14		
	50.0%	47.5%	35.0%		
	10	9	18		
	25.0%	22.5%	45.0%		
Occupation					
Housewife Employee	10	15	13	1.46	>0.05
	25.0%	37.5%	32.5%		
	30	25	27		
	75.0%	62.5%	67.5%		
Residence					
Rural Urban	21	20	10	7.6	<0.05*
	52.5%	50.0%	25.0%		
	19	20	30		
	47.5%	50.0%	75.0%		

(*) Statistically significant at p<0.05

The sociodemographic data are displayed in Table 1. The table shows that participants were not significantly different in terms of age, education and occupation. The majority of participants in all groups were between the ages of 21 to 30 years. As for education; half of participants in the control and guided imagery groups were secondary educated. There was a statistically significant difference between groups regarding residence as more than half of the relaxation group participants were urban residents.

Table 2: Data about present pregnancy

Present Pregnancy	**Group**			**Chi squaretest**	**P.value**
	Control	**Guided Imagery**	**Progressive Relaxation**		
Gravidity					
Primigravida	40	40	40	-	-
Multigravida	100%	100%	100%		
	0	0	0		
	0%	0%	0%		
Gestational age					
2nd trimester 3rd	19	17	25	3.5	>0.05
trimester	47.5%	42.5%	62.5%		

	21	23	15		
	52.5%	57.5%	37.5%		

Table 2 shows data about participants' present pregnancy. The table shows no difference between groups regarding gravidity. This result comes as an inclusion criterion for participation in the study. Regarding the gestational age; and also as an inclusion criterion; all participants were at their 2nd or 3rd trimester of pregnancy.

Table 3: Participants' average daily sleep time per minute before and after the intervention

Average daily sleep time (min)	**Group**			**ANOVA test**	**P value**
	Control	**Guided imagery**	**Progressive relaxation**		
Before intervention (Mean ± SD)	27.62±23.87	22.49±21.38	19.03±20.61	1.34	<0.05*
After intervention (Mean ± SD)	28.63±22.82	19.20±10.31	15.13±10.61		

(*) Statistically significant at p<0.05

Table 3 displays Participants' average daily sleep time per minute before and after the intervention. The table shows that there was a statistically significant difference between groups regarding sleep time after the intervention as compared to the pre-intervention period. The progressive relaxation group participants need to sleep less time during the day due to having enough sleep time at night after the intervention.

Table 4: Comparison of mean PSQI scores in the three groups before and after the interventions and the resulting changes

PSQI	**Group**			**Paired t-test**	**p.value**
	Control	**Guided imagery**	**Progressive relaxation**		
PSQI Before intervention	7±1.2	8.1±1.5	7.25±1.4	0.13	>0.05
PSQI After intervention	7±1.2	4.8±1.14	3.5±0.78	0.28	<0.001*
The amount of change	0±0	3.3±0.36	3.75±0.62	0.51	<0.001*

(*) Statistically significant at p<0.001

Table 4 shows a comparison of mean PSQI scores in the three groups before and after the interventions and the resulting changes. Results in this table shows that there was a statistically significant difference between groups after the intervention regarding score of sleep quality index. The progressive relaxation group's participants tend to have a high quality sleep after the intervention indicated by having the lowest PSQI score and the highest amount of score change as compared to other both groups.

Table 5: Comparison of changes in sleep quality components among the three groups

Components of Sleep Quality	**Groups**			**Kruskal-Wallis test**	**p.value**
	Control	**Guided imagery**	**Progressive relaxation**		
	Amount of changes Median (Interquartile range)	**Amount of changes (Interquartile range)**	**Amount of changes (Interquartile range)**		
Sleep efficiency	1(2)	-1(1)	-1(2)	2.654	P<0.001*
Sleep duration	1(1)	-1(1)	-1(2)	8.987	P<0.001*
Daytime dysfunction	1(1)	-1(1)	-1(2)	7.945	P<0.001*
Sleep latency	0(1)	-1(1)	0(1)	8.541	P<0.001*
Sleep disturbances	0(0.75)	0(1)	1(2)	9.170	P<0.001*
Subjective sleep quality	1(1)	-1(1)	1(2)	7.709	P<0.001*

(*) Statistically significant at p<0.001

Table 5 represents a comparison of changes in sleep quality components among the three groups. It is clearly noticed that there was a significant difference in the components of sleep quality between the control and intervention groups (P<0.001).

The two intervention groups showed a significant difference in terms of sleep efficiency, sleep duration, daytime dysfunction, sleep disturbances and subjective sleep quality. Progressive muscle relaxation had a more significant impact on these components, compared to guided imagery. As use of sleeping medications underwent no change after the study as all participants were not taking such drugs due to being pregnant, it is not mentioned in Table5.

In sum and based on results displayed in tables 3, 4 and 5; the first hypothesis is accepted while the second one is rejected. This means that progressive muscle relaxation as one of the non-pharmacological interventions was effective in improving participants sleep quality among primigravida women.

IV. Discussion

Due to hormonal shifts during the menstrual cycle, pregnancy and menopause, sleep disorders are more common in women than men[6]. One of the causes of sleep disorders is pregnancy[8]. Diminished sleep quality is one of the common pregnancy complaints[9], mostly in the third trimester of pregnancy as the mother reaches the end of pregnancy. In fact, the incidence of sleep disorders has been reported around 75% in the third trimester [10]. Poor sleep quality could be related to preterm labor, low birth weight, blood pressure disorders, glucose tolerance disorders, and depression during and after pregnancy [15]. The most common therapeutic methods for sleep disorders are pharmaceutical treatments in which by the suppression of the central nervous system, anxiety and stress levels decrease and the patient becomes hypnotic and relaxed[11].

However, pharmaceutical methods are contraindicated during pregnancy due to some potential risks for the fetus and their impacts on fetal growth and development [19]. Therefore, alternative non - pharmaceutical methods with no side - effects should substitute pharmaceutical methods for the treatment of sleep disorders. Behavioral therapy is one of non- pharmaceutical methods for sleep problems. Relaxation, which relieves external stressors, has been widely applied in recent years and is considered a simple, feasible and useful behavioral approach [29]. There are various relaxation techniques such as progressive muscle relaxation, guided imagery, massage, hypnotism, yoga, music therapy, and breathing techniques [13]. Progressive muscle relaxation is a widely-applied method, which has been shown to be effective in decreasing physical and cognitive stress and improving self-confidence[19].

The current study was conducted with aim of studying the effect of non-pharmacological interventions on sleep quality during pregnancy among primigravida. Based on the current findings; the first study hypothesis was accepted. Researchers found that both progressive muscle relaxation and guided imagery enhanced pregnant women's sleep quality; however, sleep quality was high among participants in the guided imagery group compared to progressive muscle relaxation. In both intervention groups, the sleep component scores also improved.

As for the participants' age; the majority of them at the three groups were at the age group of 21-30 years and this comes in accordance with [10] who studied disturbed sleep and inflammatory cytokines in depressed and non-depressed pregnant women in Canada and reported studying similar age group. The current study findings revealed that about half of the studied participants were secondary educated. This finding is similar to that of [29] who studied the effects of relaxation on psychobiological wellbeing during pregnancy among Australian women.

Nearly half of the studied samples were employee, which is like a finding reported by [26] who conducted their study at USA about relaxation rehearsal therapy for chronic nightmares in sexual assault survivors with posttraumatic stress disorder. Regarding the residence, the current results revealed a statistical difference between progressive relaxation group compared to other groups. Three fourths of this group participants were urban residents. This is similar to findings of [18] who conducted a study at Ahsaa about the effect of relaxation and mental imagery and relaxation therapy on anxiety and hopefulness in women with breast cancer and published urban resident participants.

In relation to the present pregnancy data of the studied participants; and as a main inclusion criterion; all participants were primipara. [24] studied the effect of relaxation on insomnia during third trimester among Iranian pregnant women. All participants were either at their second or third trimester of pregnancy which was also an inclusion criterion. The more pregnancy advance, the more complain from sleep disturbance and this is why the researchers selected these pregnancy stages. [29] who studied the effects of relaxation on psychobiological wellbeing during pregnancy among Australian women also reported selecting this gestational age for the same cause.

Pertaining to participants' average daily sleep time per minute before and after the intervention; the current findings showed that there was a statistically significant difference between groups regarding sleep time after the intervention as compared to the pre-intervention period. The progressive relaxation group participants need to sleep less time during the day due to having enough sleep time at night after the intervention. On one hand; such findings were agreed upon by [26] who conducted their study at USA about relaxation rehearsal therapy for chronic nightmares in sexual assault survivors with posttraumatic stress disorder and reported that, the effectiveness of relaxation technique in improving the sleep quality of patients with post –traumatic stress disorders.

On the other hand; these findings are contradicted to that of [27] who studied guided imagery: an innovative approach to improve sleep quality among Netherland pregnant women as they reported that guided imagery group participants need short naps as they could sleep well at night. The contradiction is seen to be

related to the difference in the sample nature as [27] studied women at their first trimester who already tended to have high sleep quality than those in the second or third as the current study ones.

Regarding the changes in participants sleep quality expressed in terms of PSQI scores; results showed that the progressive muscle relaxation group's participants tend to have a high quality sleep after the intervention indicated by having the lowest PSQI score and the highest amount of score change as compared to other groups. On one hand; this is supported by [31] who compared the effects of progressive muscle relaxation and guided imagery on sleep quality in primigravida women referring to Mashhad health care centers, Iran as the study results revealed a significant difference between the two intervention groups regarding the score of PSQI before and after the intervention. [32] reported similar findings through assessing sleep during pregnancy in a study across two time points examining the Pittsburgh sleep quality index and associations with depressive symptoms among Europeans. [32] reported that participants were trained for progressive muscle relaxation using one session and were followed-up and the results indicated the effectiveness the method even after one session.

On the other hand; [33] studied behavioral-educational intervention to promote maternal and infant sleep among African women and contradicted the current findings as they recently published that "it could not be definitely identified which method is preferred for improving sleep quality". The contradiction comes from that the same woman was asked to do both interventions so the result couldn't be rationalized by definite intervention.

V. Conclusion

In the light of the current study findings, it can be concluded that the first research hypothesis is accepted while the second one is rejected. The current findings revealed that progressive muscle relaxation 'as one of the non- pharmacological interventions' was effective in improving participants sleep quality among primigravida women.

VI. Recommendations

Establish an ante-natal plan for assessing and detecting sleep problems beside routine care.

Plan with the maternal and child health center authority for a teaching class to increase primigravida women's knowledge about pregnancy and its effect on vital functions including sleep.

Instruct pregnant women about appropriate non-pharmacological interventions which have no side-effects to improve sleep quality.

Provide training sessions to primigravida women about how to perform appropriate techniques of non-pharmacological interventions to improve their sleep quality.

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