EFFECT OF RELAXATION TECHNIQUES ON FEMALE MILK SECRETION

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Abstract

Background: Breast feeding maintains the maternal foetus link favours the transmission of immune-competence from the mother to her infant and is considered an important contributory factor to the neo natal immune defence system.

Purpose: This study was conducted to investigate the effect of relaxation techniques on female milk secretion.

Subjects and methods:

Six weekspostpartum, 30 sedentary women whose infants, their age was ranged between 20-30 years and body mass index didn't exceed 30Kg/m^2 participated in this study.They were exclusively breast-feed andrandomlyassigned to an study group (15 women) received breast feeding and nutritional advice in addition to relaxation training program for 45 minutes per day, 3 days per week, for 6 weeks or a control group (15 women) recieved breast feeding and nutritional advice only. Blood cortisol was assessed at base line and after 6 weeks.

Results: Women in group A had a lower level of blood cortisol than women in the control group (17.85 ± 0.47 vs 18.99 ± 0.58 mcg/dL).

Conclusion:relaxationtraining during lactation ,decreased blood cortisol level and enhance milk secretion.

Key Words: Relaxation Techniques, cortisol, Breast Milk

Introduction

Breast feeding maintains the maternal foetal immunological link. After birth, favors the transmission of immune-competence from the mother to her infant and is considered an important contributory factor to the neonatal immune defence system during a delicate and a crucial period for immune development[(1)]**.**

Relaxation techniques decrease levels of salivary cortisol, blood glucose, as well as plasma renin levels, and 24-h urine norepinephrine and epinephrine levels. Also, it reverses the negative impact of stress on the immune system by increasing levels of immunoglobulin A and natural killer cells.Preterm mothers are at risk of not producing adequate milk. Multiple factors affect the production of milk, including stress, fatigue, and the separation of the breastfeeding dyad especially when mother or infant is hospitalized[(2)].

Significance of Relaxation techniques as music, yoga are pain relief, reduce stress, fatigue, feeling uncomfortable, enhance psychological state. Music therapy offers a long history of clinical practice and research that supports the use of music therapy to reduce or manage stress, fatigue and accompanying symptoms[(3-6)]

Stress and fatigue are considered to inhibit lactation.Mothers of premature infants are known to be 3 times likely to experience clinically significant psychological distress than are those of the normative population**.**Changes in prolactin levels following childbirth are implicated in postpartum depression. Women suffering from postpartum depression have significantly lower plasma prolactin levels than new mothers not suffering depression[(7-13)].

Subjects

This current study was designed toinvestigate the effect of relaxation techniques on female breast milk. This study was conducted in outpatient clinic of Om El Masryeen General Hospital in Cairo.

Design of the Study

2 group pre-test post-test and Randomized controlled design

Subjects:

Thirtybreast feeding mothers with a single, mature infant has been participated in the study**.** Subjects were recruited from outpatient clinic of Om El Masryeen General Hospital in Cairo .Patients were randomly divided into two equal groups using envelope method:

- **Group (A) (relaxation training group) (Experimental group):** It wasconsisted of 15breast feeding mothers who received breast feeding and nutritional counselling and engaged in relaxation training program.
- **Group (B) (Control group):** It was consisted of 15breast feeding mothers who only received the same breast feeding and nutritional counselling for 6 weeks.

Inclusive Criteria:

The patients were chosen under the following criteria:

- Thirty breast feeding mothers with a single, mature infant.
- Their age was ranged from 20 to 35 years.
- Their body mass index was ranged from 20-25 kg/m^2.

Exclusive Criteria:

- Poor lactation, anemia, diabetes mellitus, any chest surgery, breast cancer or infection, postpartum complications, any retracted cracked, inflamed or inverted nipples or any other condition that compromises lactation such as retained placental fragments, postpartum hemorrhage. Also, breast-feeding mothers that had received any kind of medications or supplementations that could influence the immune function were excluded from this study.
- Mother who receive any kind of medications as contraceptive pills,
- Any peripheral circulatory abnormality e.g. peripheral arterial diseases or deep venous thrombosis,

The main materials and methods that used in the current study were classified into two main categories Evaluation and Therapeutic instrumentation.

Materials

Weight and height scale:

Weight and height was measured for each breast-feeding mother before and after the study tocalculate BMI and calories needed /day

Calories needed/day for each breast feeding mother was calculated as follow:Estimated energy requirement (EER)=354-(6.91xage (year))+physical activity level x ((9.36x weight (kg))+(726 x height (m))+330 Kcal. Establishing that Physical activity level was 1.12 for group A **(Experimental group)**and 1.0 for group B**(Control group)**.

A venepuncture:

A venipuncture was done using a vacutainer to collect the blood samples from the mothers in 2 groups before and after the treatment programto determine cortisol levels,IgA concentration and total leukocytescount in the blood sample.

Blood samples was collected before and after treatment for measurement of the level of blood cortisol concentrations via cortisol ELISA kit to assess maternal stress .

Treatment materials and methods

Relaxation training:

Each mother in group (A) wore light and comfortable clothes during relaxation training session for six weeks with frequency 3 sessions per week for six weeks with total of 18 sessions in the whole treatment.

Mindfulness meditation:

Each mother in group (A) was sit comfortably, focusing on her breathing, and bringing mind's attention to the present moment without drifting into concerns about the past or the future.

Autogenic relaxation:

Each mother in group (A) was use both visual imagery and body awareness to reduce stress. She was repeat words or suggestions in her mind that may help relaxation and reduce muscle tension. For example, she may imagine a peaceful setting and then focus on controlled, relaxing breathing, slowing her heart rate, or feeling different physical sensations, such as relaxing each arm or leg one by one.

Progressive muscle relaxation:

Each mother was focus on slowly tensing and then relaxing each muscle group. In one method of progressive muscle relaxation, she was start by tensing and relaxing the muscles in her toes and progressively working her way up to her neck and head. She was start with her head and neck and work down to her toes. Tense her muscles for about five seconds and then relax for 30 seconds, and repeat.

Breast feeding and nutritional counselling:

Each breast-feeding mother in both groups (A&B) received breast feeding advice and nutritional counselling, although was given abrochure[(14)]about proper breast-feeding technique breast massage techniques, proper maternal nutrition and fluid intake during breast feeding.

During the 6 weeks of the study, all mothers received the same average daily diet.

Results

This study was conducted to investigate the effect of relaxation techniques on female breast milk.

Thirtybreast feeding mothers with a single, mature infant without any complications had been participated in the study.Subjects was recruited from outpatient clinic ofOm El Masryeen General Hospital in Cairo. Mothers were randomly divided into two equal groups using envelop method: **Group (A) (relaxation training group) (Experimental group):** It was consisted of 15breast feeding mothers who received breast feeding and nutritional counselling and engaged in relaxation training program.**Group (B) (Control group):** It was consisted of 15breast feeding mothers who only received the same breast feeding and nutritional counselling for 6 weeks.

Normality test was conducted to all variables and revealed that all variables are normally distributed within each group.The results of this study were presented in this chapter under the following headings:

- Demographics characteristics: mothers and infants.
- Measurement variables: mothers and infants.

Demographics:

Mothers demographics:

Thirty breast feeding mothers with their age ranged from 20-30 years and BMI didn't exceed participated in this study. They were classified into two groups (A and B) of equal number;

Group (A): include fifteen breast feeding mothers women of age with the mean ± SD value was (28.4 ± 3.68) years, weight with the mean ± SD value was (62.93 ± 4.58) kg, height with the mean ± SD value was (1.63 ± 0.05) cm and BMI with the mean ± SD value was (23.54 ± 0.99) kg/m2 as shown in table (1)

Group (B): include fifteen breast feeding mothers women of age with the mean ± SD value was (28.07 ± 4.09) years, weight with the mean ± SD value was (63.47 ± 5.39) kg, height with the mean ± SD value was (1.64 ± 0.06) cm and BMI with the mean ± SD value was (23.57 ± 1.06) kg/m2 as shown in table (1)

Also the unpaired t test statistics showed that there is no statistically significant difference between groups regarding age, weight height and BMI as t

values were 0.227, -0.286, -0.288 and 0.064, and P values were 0.882, 0.777, 0.775 and 0.95 respectively as shown in table (1).

Table(1): Mothers demographics distribution among groups

	Group A	Group B	T value	P value	Sig.
Age (years)	29.4 ± 2.68	29.05 ± 3.09	0.227	0.822	NS
Weight (KG)	62.93 ± 4.58	63.47 ± 5.39	-0.286	0.777	NS
Height (m)	1.63 ± 0.15	1.64 ± 0.26	-0.288	0.775	NS
BMI (KG/m2)	23.64 ± 0.99	23.67 ± 1.36	-0.064	0.95	NS

1.1 Estimated energy requirements:

As presented in table (2). The mean value of estimated energy requirements was 2476.41 ± 89.48 and 2274.81 ± 100.43 for Group A and B respectively, where the t value was 5.608 and P-value was 0.000 which leads us to that there is no statistically significant difference between groups.

Table(2): estimated energy requirement distribution among groups

	Group A	Group B
Mean ± SD	2476.41 ± 89.48	2274.81 ± 100.43
Unpaired T value	5.608	
P value	0.00	
Sig.	NS	

2. Measurement variables:

2.1 Mothers measurement variables:

Cortisol level:

As presented in table (3). In group A, the mean value of pre-treatment cortisol level was 16.71 ± 0.42 and 17.85 ± 0.47 for post treatment where the paired t value was -16.592 and P-value was 0.000. But in group B, the mean value of pre-treatment cortisol level was 16.9 ± 0.5 and 18.99 ± 0.58 for post treatment where the paired t value was -22.070 and P-value was 0.001. And that means that there is statistically significant difference between pre and post treatment values in both groups, also when comparing both groups pre and post values, the unpaired t values were -1.04 and -5.769 and P values were 0.307 and 0.001and that means that there is statistically significant difference between both groups regarding pre and post treatment values.

Table(3): Cortisol level distribution among groups

	Pre-Group A (mcg/dL)	PreGroup B(mcg/dL)	Post-Group A(mcg/dL)	Post-Group B(mcg/dL)
Mean ± SD	16.71 ± 0.42	16.9 ± 0.5	17.85 ± 0.47	18.99 ± 0.58
Improvement	1.14		2.09	
Paired T value	-16.592		-22.070	
P value	0.000		0.000	
Sig.	S		S	
	Pre_values		**Post_values**	
Unpaired T value	-1.04		-5.769	
P value	0.307		0.001	
Sig.	NS		S	

Discussion

This study was conducted to investigate the effect of relaxation techniques on female breast milk. Thirty breast feeding mothers with a single, mature infant without any complications had been participated in the study.Subjects were recruited from outpatient clinic ofOm El Masryeen General Hospital inCairo. Mothers were randomly divided into two equal groups using envelop method: Group (A) (relaxation training group) (Experimental group): It composed of 15 women who received relaxation training program in addition to breast feeding and nutritional advices and Group (B) (Control group): It composed of 15 women who received breast feeding and nutritional advices only. The results showed that mean mother's age was 28.4 ± 3.68 and 28.07 ± 4.09 for group A and B respectively, there were statistically significant difference between pre and post values regarding cortisol level, IgA level, and leucocyte count in both group A & B with more significant results in group (A).

Results of this study revealed that, there was significant decrease in cortisol level in group (A) who received relaxation training program in addition to breast feeding and nutritional advice for 6 weeks this agree with[(10)]**Laura et al. (2002)** who proved that relaxation exercise ledto significantly lower levels of post-intervention heart rate, stateanxiety, perceived stress, and salivary cortisol than control subjects, as well as increasedlevels of self-report levels of relaxation.

The immune system of preterm infants is immature, placing them at increased risk for serious immune-related complications. Human milk provides a variety of immune protective and immune maturation factors that are beneficial to the preterm infant's poorly developed immune system. The most studied immune components in human milk include antimicrobial proteins, maternal leukocytes, immunoglobulins, cytokines

and chemokines, oligosaccharidescortisol, gangliosides, nucleotides, and long-chain polyunsaturated fatty acids. There is growing evidence that these components contribute to the lower incidence of immune-related conditions in the preterm infant. Therefore, provision of these components in human milk, donor milk, or formula may provide immunologic benefits[(11)].

Also, **Van Rood et al. (1993)**[(14)], stated that reductions in cortisol level actually enhance the endocrine system. While experiments have shown that increasing cortisol leads to a decrease in the immune system's functioning, the logical conclusion that decreasing cortisol leads to increases in immune parameters is an assumption and still needs to be empirically examined.

Also, **Mohd et al., (2018)[(15)]**stated thatmaternal psychological state is recognized to influence lactation success, largely by affecting milk ejection. Thus, increased psychological distress can disrupt milk flow and in the longterm, affect milk synthesis. Conversely, it is possible that milk ejection could be improved by using relaxation therapy during breastfeeding.

In addition to **Anita et al. (2018)**[(1)] revealed that relaxation massage promotes the milk production in postnatal mother that increases the release of oxytocin from posterior pituitary which supports relaxation and bonding and may decrease anxiety and better enjoy breastfeeding. A acupressureonthe upper back and nerves that serve the breast originate in the upper spine, between the shoulder blades,massaging this area relaxes the shoulders and promotes milk let-down.

In another, a study to determine the dose effects of relaxation practice on immune responses and describe the types of relaxation techniques preferred and the extent of relaxation practice over 10 months. Relaxation practice significantly contributed to the variance of natural killer cell activity, lymphocyte proliferation, IL-4, and IL-10 responses in a positive direction; the higher the relaxation practice, the higher the immune responses. In comparison, IFN-γ, IL-2, and IL-6 responses were not affected. The deep-breathing method was most preferred by participants, followed by progressive relaxation and imagination or visualization. The mean weekly frequency of relaxation practice was 5.29 (SD = 3.35), and the mean duration of relaxation practice was 19.16 (SD = 10.81) minutes per session. Persistent relaxation practice may have positive effects on multiple immune responses in a dose-dependent manner[(16)].

Conclusion: relaxationtraining during lactation breast milk decreased blood cortisol level and enhance milk secretion.

References

1. Anita A., Achamma V., Balkishan S. and Anil K.(2018)**.** Assessment and comparison between effectiveness of techniques of improving lactation among postnatal mothers of new born babies ; Asian Journal of Medical Sciences, 9 (1): 41-49
2. Ben-Horin S, Yavzori M, Kopylov U. (2011):Detection of infliximab in breast milk of nursing mothers with inflammatory bowel disease. Journal of Crohn's and Colitis 5(6):555-558.
3. Benaboud S, Pruvost A, Coffie P A, et al. (2011):Concentrations of tenofovir and emtricitabine in breast milk of HIV-1-infected women in Abidjan, Cote d'Ivoire, in the ANRS 12109 TEmAA Study, Step 2. Antimicrobial agents and chemotherapy 55(3):1315-1317,
4. Chuang L-L, Lin L-C, Cheng P-J, et al. (2012):The effectiveness of a relaxation training program for women with preterm labour on pregnancy outcomes: A controlled clinical trial. International Journal of Nursing Studies 49(3):257-264,
5. Gallucci N T.Sport psychology: Performance enhancement, performance inhibition, individuals, and teams. Psychology press, 2013.
6. Volpato E, Banfi P, Rogers S M, et al. (2015):Relaxation techniques for people with chronic obstructive pulmonary disease: a systematic review and a meta-analysis. Evidence-Based Complementary and Alternative Medicine 2015(
7. Biancuzzo M.Breastfeeding the Newborn: Clinical Strategies for Nurses. Mosby, 1999, 13(1), 92-93.
8. Campbell-Yeo M L, Allen A C, Joseph K, et al. (2010):Effect of domperidone on the composition of preterm human breast milk. Pediatrics 125(1):e107-e114.
9. Ewaschuk J B, Unger S, O'connor D, et al. (2011):Effect of pasteurization on selected immune components of donated human breast milk. Journal of Perinatology 31(9):593.

10. Laspiur, J. P., Burton, J. L., Weber, P. S. D., Kirkwood, R. N., & Trottier, N. L. (2004). Amino acid transporters in porcine mammary gland during lactation. Journal of dairy science, 87(10), 3235-3237.
11. Verduci E, Banderali G, Barberi S, et al. (2014):Epigenetic effects of human breast milk. Nutrients 6(4):1711-1724.
12. Zhou Q, Li M, Wang X, et al. (2012):Immune-related microRNAs are abundant in breast milk exosomes. International Journal of Biological Sciences 8(1):118-125.
13. Laura A. Pawlow, Gary E. Jones ; (2001). The impact of abbreviated progressive muscle relaxation on salivary cortisol, Biological Psychology 60: 1–16.
14. Beal A C, Kuhlthau K and Perrin J M (2016):Breastfeeding advice given to African American and white women by physicians and WIC counselors. Public Health Reports, 118 (4): 368-376.
15. Van Rood Y, Bogaards M, Goulmy E, et al. (1993):The effects of stress and relaxation on thein vitro immune response in man: A meta-analytic study. Journal of Behavioral Medicine 16(2):163-181.
16. Mohd Shukri, N. H., Wells, J. C., & Fewtrell, M. (2018). The effectiveness of interventions using relaxation therapy to improve breastfeeding outcomes: A systematic review. Maternal &Child Nutrition, 14(2), e12563.
17. Traci McArdle BS, R. N., Na-Jin Park PhD, R. N., & Carpenter, J. (2011, May). Dose effects of relaxation practice on immune responses in women newly diagnosed with breast cancer: an exploratory study. In Oncology nursing forumOncology Nursing Society. 38(3):E240.