

Effects of Progressive Muscle Relaxation Technique and Acupuncture in Reducing Anxiety and Depression in Polycystic Ovarian Syndrome

Running Title

Effects of physical therapy on depression in Polycystic Ovarian Syndrome

Dr. Sumaira Abdul Ghani

Mphil (PT)

Senior Lecturer

Taqwa institute of Physiotherapy and Health Sciences

Dr. Syed Saif ul Haq

Mphil (PT)

Senior Lecturer

Taqwa institute of Physiotherapy and Health Sciences

Dr. Salma Azeem

MS (PT)

Senior Lecturer

Taqwa institute of Physiotherapy and Health Sciences

Dr. Asma Hameed

MS (PT)

Assistant Professor

Ziauddin University

Muhammad Mansoor Alam Khan

B.Pharm

Lecturer

Taqwa institute of Physiotherapy and Health Sciences

Corresponding Author

Dr. Syed Saif ul Haq

Mphil (PT)

Senior Lecturer

Taqwa institute of Physiotherapy and Health Sciences

Abstract

Objectives

Polycystic ovary syndrome (PCOS) is a hormonal disorder that affects women of reproductive age. It is characterized by the presence of multiple small cysts on the ovaries, irregular menstrual periods, and high levels of male hormones (androgens) in the body affecting 5-15% of women in the reproductive age group.

Methods

A single-blinded randomized controlled trial was conducted enrolling 34 PCOs patients with age range between 18-30 years that were randomly divided into progressive muscle relaxation (group-A) and acupuncture (group-B) using envelop method of simple random sampling technique. The study was performed at Asma Clinic and Maternity. The treatment was performed for a duration of 8 weeks, 3 non-consecutive sessions per week, each lasting for a duration of 30 minutes. The outcome of depression was assessed after 8 week of intervention using Montgomery and Asberg Depression Rating Scale (MADRS).

Results

A total of 42 PCOS patients were screened in from January to November 2022, out of which 8 patients did not meet the inclusion criteria. The mean age of participants was 24.9 ± 3.4 and 25.1 ± 3.6 in group A and B respectively. The results of our study indicated that the PMR and Acupuncture techniques are indeed efficacious in improving the severity of depression and anxiety accompanying women suffering from PCOs with mean difference of 19.2 ± 6.7 ($p < 0.05$) and 24.5 ± 7.0 in both groups respectively.

Conclusion

Based on the findings of this study, it can be suggested that alternative treatments such as progressive muscle relaxation (PMR) and acupuncture may be effective in managing depression and anxiety in women with polycystic ovary syndrome (PCOS). These therapies may be used alongside conventional treatments to promote both physical and mental well-being in these patients.

Keywords:

Depression; polycystic ovary syndrome; physical therapy; stress; relaxation exercise.

Introduction

Polycystic ovary syndrome (PCOS) is a common hormonal disorder among women of reproductive age. It is estimated that approximately 5-15% of women in this age group experience hormonal imbalances that can result in a range of symptoms¹. PCOS can have a significant impact on fertility. The hormonal imbalances associated with PCOS can disrupt the normal functioning of the reproductive system, making it more difficult for a woman to become pregnant. Some of the adverse effects of PCOS on fertility include: irregular menstrual cycles, anovulation, high levels of androgens, insulin resistance, and obesity^{2, 3}. In addition to its effects on the reproductive system, PCOS can also have far-reaching consequences for a woman's overall health. The disorder is associated with an increased risk of metabolic, cardiovascular, immune, and psychological health problems, among others. These health issues can have a significant impact on a woman's quality of life and may require ongoing medical management^{4, 5, 6, 7}. The prevalence of PCOS can vary depending on the diagnostic criteria used to identify the condition. The World Health Organization (WHO) has estimated that PCOS affects approximately 3.4% of the global female population, which translates to approximately 116 million women worldwide, as of 2010⁸. However, the actual prevalence of PCOS may be higher, as many cases go undiagnosed or are not reported. It is worth noting that the prevalence of PCOS can also vary depending on geographic and ethnic factors. For example, studies have suggested that PCOS may be more common in South Asian women, than in others. Additionally, the prevalence of PCOS may be influenced by lifestyle factors, such as diet and exercise habits. According to a study conducted in 2019, the reported prevalence of PCO between 2008 and 2019 was 55.41% among the age group of 15-40 years where

the increased associated complaints such as migraine, anxiety and depression was also documented⁹. According to the diagnostic criteria established by the Rotterdam Consensus in 2003⁷, PCOS is diagnosed in the presence of at least two of the following three features: 1) oligo- or anovulation, 2) clinical and/or biochemical signs of hyperandrogenism, and 3) polycystic ovaries on ultrasound examination. Women with PCOs are especially susceptible to the negative feelings. PCOs by its very nature can cause major impacts on mental state by virtue of its hallmark hormonal imbalances, morphological features¹⁰ (Hirsutism, Acne, Obesity) and infertility. Women suffering from this condition are reportedly dissatisfied from their physique, perceive loss of femininity and feel very self-conscious. The resulting low self-esteem has been linked to anxiety, depression and increased incidences of general psychiatric (including somatic) complaints¹¹. Moreover, infertility and obesity are also a source of high emotional distress, anxiety, frustrations and inferiority complexes. Obesity can itself be very blemishing in the mind of otherwise healthy subjects, without any accompanying clinical feature of the illness and summated with the other traits of PCOs, the whole picture can be very difficult for the patient to deal with¹². The emotional hardships entailed with the diagnosis of PCOs also need to be recognized and addressed properly through a multidisciplinary approach. Previously, many studies have been aimed towards successfully finding a cure/prevention therapy for PCOs and all co-morbidities associated with it, including depression and anxiety. But limited data is available with respect to the psychological aspects of the disease rather it's a combination of both pharmaceuticals and adjunctive treatments. There is sufficient research on pharmaceutical aspects but there is much to be said and learn about the alternate form of treatments effective in the management of depression and anxiety associated with PCOs. Hence the study is aimed to identify the effects of acupuncture and progressive muscle relaxation technique.

Methods

The study was a single-blinded randomized controlled trial. A total of 34 female PCOs patients were recruited in the study. The study was performed at Asma Clinic and Maternity Home (ERC No: ASC-PT-0124/08/2021) under the supervision of gynecologist and a senior physical therapist between January 2022 till November 2022. Females with age in between 18-30 years with predispose symptoms of PCOS were further evaluated by gynecologist as per Rotterdam criteria as well as those who achieved score 11 or more on Beck's Depression Inventory scale were invited to take part in study. Patients taking anti-depressants and/ or undergoing psychotherapy, diagnosed condition eg asthma or cancer that may hinder their performance or that would not allow to exercise were excluded. Written consent form was provided in which intervention procedure, risks and benefits were explained. After the written consent was obtained, participants were randomly divided n=17 into one of the two treatment group i.e. Group A that received progressive muscle relaxation (PMR) and Group B that received acupuncture. Both groups were given 8 weeks of treatment session, three sessions a week alternatively. Each session was comprised of 30 minutes. The outcome of depression was assessed after 8 week of intervention using Montgomery and Asberg Depression Rating Scale (MADRS).

Progressive Muscle Relaxation

The PMR intervention had 8 weeks of technique followed relaxation by Jacobson¹³. The patients were asked to lie down comfortably in supine position on the couch and relax. The therapy involved systemic relaxation of 10 major muscle groups. Then the participants were taught to contract and relax the muscles. These includes right bicep, left bicep, shoulders, upper back, abdominal and stomach region, right thigh, left thigh, right calf, left calf, hand and forearm. All patients were evaluated before and after treatment.

Acupuncture

The Acupuncture technique was used on the acupuncture points of only abdominal muscles. Details of therapy administration are as: The therapy involved usage of only manual acupuncture method. In the very first session, there was a group discussion held about the introduction of anxiety and depression in patients with PCOs and its effects. Disposable, stainless steel needles (0.25*40mm) will be inserted in supine position around 10-30mm deep depending upon the muscle location¹⁴. The acupuncturist will feel tightness around the needle and patient will feel numbness, soreness and heaviness at the point and sensations can radiate along the supply channel. This needle will remain inserted for 30 minutes, will be twisted after 10 minutes and lifted manually after 30 minutes.

Data Analysis Strategy

Data was entered on SPSS (Statistical Package for the Social Science) software, version 23. Descriptive statistics was applied, mean and standard deviation was calculated for quantitative data whereas frequency and percentage was calculated for qualitative data. Test of normality was analyzed for distribution of data using skewness and kurtosis. Paired sample t test was used as the data was normally distributed to compare the pre and post effects of intervention whereas Independent t test was used for comparison analysis between the two groups.

Ethical Consideration

Study was completed according to the guidelines of Belmont Report of Helsinki Declaration. The protocol was approved from Institutional approval board of Al-Shifa Rehabilitation Center, IRB number ASC-PT-0123/11/2021.

Results

Demographic Details

A total of 42 PCOS patients were screened in from January to November 2022, out of which 8 patients did not meet the inclusion criteria. Total 34 eligible patients were divided into Group-A n=17 and Group-B n=17. The allocation of patients was based on randomization using the sealed envelope method. The mean age of participants was 24.9 ± 3.4 and 25.1 ± 3.6 in group A and B respectively. Out of total participants 18 were married and 16 were un-married. (Table 1).

<i>Table-1: Demographic Characteristics</i>		
	Group-A (Progressive Muscle Relaxation)	Group-B (Acupuncture)
No. of participants	n=17	n=17
Mean±SD		
Age (Years)	24.9±3.4	25.1±3.6
Marital Status	Frequency (%)	
Married	8 (47.1%)	10 (58.8%)
Unmarried	9 (52.9%)	7 (41.2%)
Weight	173.3 + 45.8	153.5 + 40.3
BDI score	22.0 ± 5.23	21.88 ± 5.84

Effects of PMR and Acupuncture on Depression Severity

Within the group analysis of effects of PMR and acupuncture on Depression severity in PCOS participants was determined by calculating their Asberg Depression Scale Score. The scores were obtained using paired t-test at 95% of confidence interval. The normality of data was identified using Skewness and kurtosis test that suggested data was within the range of normal distribution of curve (± 1.96). The result revealed that mean score of depression was 27.7 ± 5.1 which improved to 19.2 ± 6.7 in group A with a mean difference of 8.5 ± 1.6 at 95% CI. In group, the effects of Acupuncture therapy on the depression intensity of PCOS participants was also significant with MD of 2.4 ± 1.0 at 95% of confidence interval. (Table 2)

Table -2 Within group analysis on depression

Item	n	Pre mean \pm S.D	Post mean \pm S.D	M.D	95% of CI	p value (<0.05)
PMR	17	27.7 ± 5.1	19.2 ± 6.7	8.5 ± 1.6	5.0 to 7.0	0.004
Acupuncture		26.9 ± 6.0	24.5 ± 7.0	2.4 ± 1.0	7.0 to 9.0	0.000

Comparison analysis of both groups on depression

Independent t-test was done to compare the effectiveness of the two therapies. The results revealed that on MADRS, post-intervention mean of PMR was 19.23 ± 6.7 , whereas post-intervention mean of Acupuncture was 24.52 ± 7.0 , which proved the significant superiority of PMR in decreasing the depression severity in PCOs patients, with a mean difference of 5.27 ± 1.0 between the two techniques (at CI of 95% and $p < 0.05$). (Table 3)

Table -3 Between group analysis on depression

Item	n	Post mean \pm S.D	M.D	95% of CI	p value (<0.05)
PMR	17	19.2 ± 6.7	$5.27 + 1.0$	-0.18 to 2.52	0.004
Acupuncture		24.5 ± 7.0		-3.43 to 0.43	0.000

Discussion

The results of our study indicated that the PMR and Acupuncture techniques are indeed efficacious in improving the severity of depression and anxiety accompanying women suffering from PCOs with mean difference of 19.2 ± 6.7 ($p < 0.05$) and 24.5 ± 7.0 in both groups respectively. However PMR was found to be more effective with mean difference of 5.27 ± 1.0 ($p < 0.05$) as compared to acupuncture group. The results of our study are consistent with the findings of study published in India that reported PMR can be very effective in reducing anxiety and depression among women with PCOs, as assessed through BDI scores before and after the PMR therapy. (Mean pre-value = 16.03 ± 6.76 , mean post-value = 6.9 ± 5.16)¹⁵. A systematic review, based on PRISMA protocol guidelines, concluded that alternate therapies that can be applied to reduce stress, anxiety, depression, and psychological fatigue include spiritual guidance, acupuncture, stress management strategies, relaxation therapies like PMR and administration of herbal and probiotic medications have demonstrated their effects on established measurement instruments like Montgomery Asberg Depression Rating Scale (MADRS-S), Brief Scale for Anxiety (BSA-S), Swedish Short-Form36 (SF-36), PCOS Questionnaire (PCOSQ), Beck Depression Inventory, DASS 21 and STAI. These therapies also lower the biomarkers associated with increased stress in the body like cortisol, adrenalin, testosterone, and malondialdehyde (MDA) and elevate endorphins levels, and therefore should be developed further to be used as an adjunct in treatment and prevention of psychological sequelae of PCOs¹⁶. A systemic literature review conducted in 2007 concluded that although there are positive findings associated with trial of acupuncture for treatment of GAD, there is not sufficient data available for forming any absolute conclusions, which is probably due to the lack of significant trials for effectiveness of acupuncture for other anxiety disorders. It also assured that the positive findings are a hint that well-organized and adequately powered studies may yield firm results¹⁷. The efficacy of acupuncture in depression has been widely investigated with regards to different sets of acupuncture points and treatment parameters (e.g., duration, frequency and number of treatment sessions). A recent Cochrane systematic review that subsumed 64 studies and approximately 7,104 participant, examined the effectiveness of acupuncture for the treatment of depression compared with different other treatment modalities and reported that Acupuncture compared to no other treatment yielded only small to moderate decrement in depression scores (SMD 0.66 lower, 95% CI), Acupuncture versus medication alone yielded small difference i.e. (SMD 0.23 lower, 95% CI), and Acupuncture plus medication versus medication alone gave

highest advantage of decrease in depression severity at the end of treatment (SMD 1.15 lower, 95% CI), and gives unclear data on Acupuncture versus psychological therapy (SMD 0.5 lower, 95% CI). But the evidence for most of the given parameters was termed as uncertain, owing to the low quality data and inadequate reports of important details like the side effect profile of acupuncture, follow-up periods and/ or long-term impacts on the patients' quality of life. Thus, High quality randomized controlled trials are necessary for determining the clinical effectiveness of acupuncture alone, and to compare it with other treatment options available, like pharmaceutical agents and psychotherapies etc^{18,19}.

Hence, there's an urgent need for a thorough evaluation of these complementary medicinal techniques, with further studies having an expanded sample size coverage, and consideration of other potential factors, that may also add up to the development of depression in women suffering from PCOs.

Conclusion

In conclusion, results from this study propose that the alternate approaches i.e. PMR and Acupuncture, for treatment of Depression and anxiety associated with PCOs are reasonably effective and can prove to be successful adjuncts to the conventional treatments used, for achieving physical and psychological stability in these patients, PMR showing better efficacy than Acupuncture in the given study.

Source of Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of Interest

The authors declares no conflict of interest.

Authors Contribution

SAG: Conceptualization, Methodology, Software

SH: Data curation, Writing- Original draft preparation.

SA: Visualization, Investigation.

AH: Supervision:

MMAH: Software, Validation.

Ethical Approval

Study was completed according to the guidelines of Belmont Report of Helsinki Declaration. The protocol was approved from Institutional approval board of Al-Shifa Rehabilitation Center, IRB number ASC-PT-0123/11/2021.

References

1. Jabeen A, Yamini V, Amberina AR, Eshwar MD, Vadakedath S, Begum GS, Kandi V. Polycystic Ovarian Syndrome: Prevalence, Predisposing Factors, and Awareness Among Adolescent and Young Girls of South India. *Cureus*. 2022 Aug 12;14(8).
2. Dennett CC, Simon J. The role of polycystic ovary syndrome in reproductive and metabolic health: overview and approaches for treatment. *Diabetes Spectrum*. 2015 May 1;28(2):116-20.
3. Rodgers RJ, Avery JC, Moore VM, Davies MJ, Azziz R, Stener-Victorin E, Moran LJ, Robertson SA, Stepto NK, Norman RJ, Teede HJ. Complex diseases and co-morbidities: polycystic ovary syndrome and type 2 diabetes mellitus. *Endocrine Connections*. 2019 Mar;8(3):R71.
4. Deswal R, Narwal V, Dang A, Pundir CS. The prevalence of polycystic ovary syndrome: a brief systematic review. *Journal of human reproductive sciences*. 2020 Oct;13(4):261.
5. Bozdag G, Mumusoglu S, Zengin D, Karabulut E, Yildiz BO. The prevalence and phenotypic features of polycystic ovary syndrome: a systematic review and meta-analysis. *Human reproduction*. 2016 Dec 1;31(12):2841-55.
6. Gilbert EW, Tay CT, Hiam DS, Teede HJ, Moran LJ. Comorbidities and complications of polycystic ovary syndrome: an overview of systematic reviews. *Clinical endocrinology*. 2018 Dec;89(6):683-99.
7. Ding T, Hardiman PJ, Petersen I, Wang FF, Qu F, Baio G. The prevalence of polycystic ovary syndrome in reproductive-aged women of different ethnicity: a systematic review and meta-analysis. *Oncotarget*. 2017 Nov 11;8(56):96351.
8. Kabel AM. Polycystic ovarian syndrome: insights into pathogenesis, diagnosis, prognosis, pharmacological and non-pharmacological treatment. *Pharm Bioprocess*. 2016 Jan 1;4(1):7-12.

9. Zafar U, Memon Z, Moin K, Agha S, Hassan JA, Zehra D. Prevalence of PCOS with associated symptoms and complications at tertiary care hospital of Karachi. *J Adv Med Med Res.* 2019;30(4):1-9.
10. Atalyan A, Buchnev O, Lazareva L, Nadeliaeva I, Danusevich I, Suturina L. Implementation of the Automated Algorithm for Diagnosis of PCOS Based on Rotterdam 2003 Criteria. In *Cybernetics Perspectives in Systems: Proceedings of 11th Computer Science On-line Conference 2022*, Vol. 3 2022 Jul 5 (pp. 54-59). Cham: Springer International Publishing.
11. Dybciak P, Humeniuk E, Raczkiwicz D, Krakowiak J, Wdowiak A, Bojar I. Anxiety and Depression in Women with Polycystic Ovary Syndrome. *Medicina.* 2022 Jul 16;58(7):942.
12. Bazarganipour F, Ziaei S, Montazeri A, Foroozanfard F, Kazemnejad A, Faghihzadeh S. Body image satisfaction and self-esteem status among the patients with polycystic ovary syndrome. *Iranian journal of reproductive medicine.* 2013 Oct;11(10):829.
13. Snow D. *The Weight of the Interaction: An Exploration of Fat Women's Experiences in Healthcare Settings* (Doctoral dissertation, Western Michigan University).
14. Chaudhuri A, Ray M, Dasgupta S, Ghosh MK, Biswas A, Hazra SK. Effect of progressive muscle relaxation on the adverse cardiovascular profile in women with polycystic ovarian syndrome. *Journal of Basic and Clinical Reproductive Sciences.* 2014;3(2):115-20.
15. Wang Q, Deng H, Cheng K, Huang Z, Yin X, Zhou Y, Yang Y, Shen W, Zhao L, Shen X. Manual acupuncture for the infertile female with polycystic ovary syndrome (PCOS): study protocol for a randomized sham-controlled trial. *Trials.* 2019 Dec;20:1-9.
16. Parle J, Savant AD. The effect of progressive muscle relaxation on depression in polycystic ovarian syndrome. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology.* 2018 Aug 1;7(8):3029-34
17. Putri NR, Widayawati MN. COMPREHENSIVE THERAPY FOR POLYCYSTIC OVARY SYNDROME: KEY POINTS TO IMPROVE QUALITY OF LIFE. In *Proceedings of the International Conference on Applied Science and Health 2019* Aug 25 (No. 4, pp. 554-564).
18. Pilkington K, Kirkwood G, Rampes H, Cummings M, Richardson J. Acupuncture for anxiety and anxiety disorders—a systematic literature review. *Acupuncture in Medicine.* 2007 Jun;25(1-2):1-0.

19. Armour M, Smith CA, Wang LQ, Naidoo D, Yang GY, MacPherson H, Lee MS, Hay P. Acupuncture for depression: a systematic review and meta-analysis. *Journal of clinical medicine*. 2019 Jul 31;8(8):1140.