International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Banu SS et al. Int J Reprod Contracept Obstet Gynecol. 2023 Jul;12(7):2206-2211
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20231935

Original Research Article

Effect of pilates and breathing exercise on quality of life and sleep quality among medical students with premenstrual syndrome

Sheerin Banu S.*, D. Buelah Jebakani[2], P. Sabitha[3]

[1]Department of Obstetrics and Gynaecology Physiotherapist, Koonimedu, Tindivanam, Villupuram, Tamil Nadu, India
[2]Department of Obstetrics and Gynecology, Mother Theresa Post Graduate and Research Institute of Health Sciences, Gorimedu, Puducherry, India
[3]Department of Obstetrics and Gynecology, Indira Gandhi Medical College and Research Institute, Kathirkamam, Puducherry, India

Received: 16 May 2023
Accepted: 06 June 2023

***Correspondence:**
Dr. Sheerin Banu S.,
E-mail: sheerinshaik175@gmail.com

ABSTRACT

Background: Quality of life and sleep quality have been documented as a challenge for college students, with reports indicating impacts on daytime functioning and academic achievement. The present study evaluates the effect of Pilates and breathing exercise on quality of life and sleep quality among medical college students.
Methods: This pre-test and post-test quasi experimental study involving 132 participants consists of one experimental group (assigned Pilates and breathing exercise) and control group (breathing exercise). After the first supervised session, participants were instructed to perform the exercise protocol three times a week for eight weeks. Quality of life and sleep quality were measured by short form 36 quality of life questionnaire and Pittsburgh sleep quality index, respectively. The variables were assessed at baseline and after eight weeks of the study.
Results: After eight weeks, findings showed an improvement in the quality of life and sleep quality in experimental group ($p<0.05$) compared to the control group. The subjects in the experimental group who followed the Pilates and breathing exercise improved quality of life after the intervention. Especially the role limitation in their activities of daily living due to health problem and emotional problem and the social functioning improved significantly comparing to the pre-test evaluation done prior to the intervention. When comparing the different PSQI components in both pre and post-test of experimental group, the strongest difference was observed in component 3 (sleep duration, $p<0.05$) and component 7 (daytime dysfunction, $p<0.05$).
Conclusions: Eight week of Pilates and breathing exercise have significant improvement in quality of life and sleep quality in medical college students.

Keywords: Breathing exercise, Quality of life, Pilates, Premenstrual syndrome, Sleep quality

INTRODUCTION

Premenstrual syndrome (PMS) is a clinical condition characterized by the cyclic presence of physical and emotional symptoms unrelated to any organic disease that appear during the five days before menses in each of the three prior menstrual cycles and disappear within four days of the onset of menses, without recurrence until at least cycle day 13.[1] Premenstrual Dysphoric Disorder (PMDD) is a severe form of premenstrual syndrome that lasts for at least more than two menstrual cycles.[2] Premenstrual syndrome affects 47.8% of women worldwide.[3] The reported prevalence estimates of PMS in India have ranged from 14.3% to 74.4% and the prevalence of PMDD in

India has varied widely between 3.7% to 65.7%.[4,5] In a population-based study by National health portal of India, 91 of individuals reported experiencing at least one symptom, 10.3 percent had PMS, and 3.1% met the criteria for premenstrual dysphoric disorder (PMDD).[6] In Puducherry high prevalence of PMS is 62.7% among college students and common premenstrual symptoms were back pain, joint and muscle aches.[7] More than 160 symptoms, ranging from fluid retention and bodily aches to migraine, fatigue, and headaches, as well as mood changes and instability, have been linked to the menstrual cycle. PMS also known as premenstrual stress, is a condition that manifests both physically and mentally.[8] Physical symptoms include breast swelling, headaches, fatigue, and weight gain, while psychological ones include irritability and stress during the late luteal phase of the menstrual cycle.[8,9] The early hypotheses were based on the observation that ovarian hormone levels were related to PMS.[10] This view is supported by the absence of PMS before puberty, throughout pregnancy, and after menopause.[11,12] One of the hypotheses holds that ovarian hormones have an impact on the Serotogenic activity of the brain.[12] Estrogen and progesterone can affect serotonin receptors.[13] While oestrogen has an antidepressant impact, progesterone increases monoamine oxidase, which is linked to the transport of serotonin and renders a person more susceptible to depression.[14] Sleep is a complex physiological and behavioural process that is important for physical and mental health.[15] Poor sleep is a major health concern that affects a large portion of university students.[15,16] Poor sleep lowers quality of life and is linked to psychological and physical issues.[16] Studies conducted among students who have PMS to know their sleep quality shown to have difficulty getting enough and good quality sleep.[17] Women with PMS had different sleep patterns than women without PMS during the follicular and late luteal phases of the menstrual cycle.[18] PMS affected women have low Quality of Life (QOL) than women without PMS.[19] There is a need to study the non-pharmacological management strategies for PMS to improve Students quality of life. Reducing the treatment gap can be achieved in large part by addressing premenstrual disorders with appropriate health policy formulation and implementation.[20] This study was aimed to evaluate the effect of pilates and breathing exercises on quality of life and sleep quality among medical college students with premenstrual syndrome.

METHODS

Subjects of the study were selected from Indira Gandhi Medical College And Research Institute, Puducherry. Intervention was given at Department of Obstetrics And Gynaecology Physiotherapy Centre, IGMC&RI. The duration of the study was from August 2022 to November 2022. Subjects in the age of 18 to 25 years who are Unmarried Students, whose menstrual cycle is regular, can read and understand English language, 81-120 score in premenstrual syndrome scale (PMSS) and Not on any medication and mineral supplements during three menstrual cycles were included in the study and presence of any chronic musculoskeletal, nervous or cardiovascular disorders, injuries, fracture and underwent any recent surgeries and Those using sleep medication were excluded from the study. SF-36 quality of life questionnaire and Pittsburgh sleep quality index has been used to assess the outcome of the intervention on baseline and after 8 weeks (Figure 1).

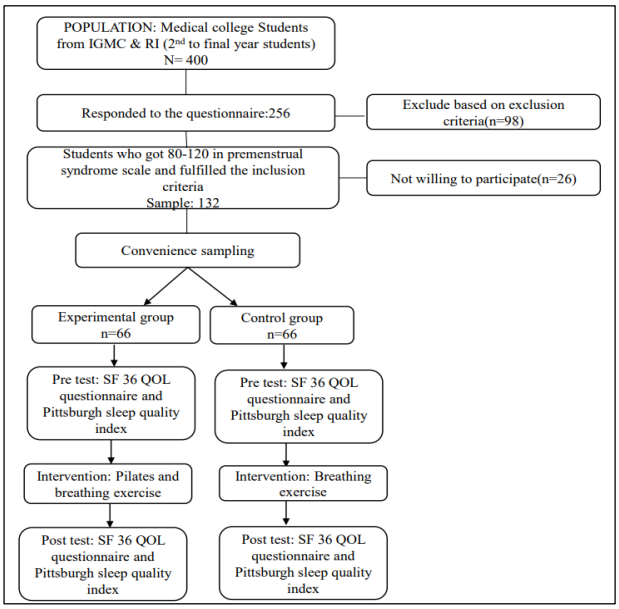

Figure 1: Consort chart of the study showing the allocation of the subjects in respective groups and the interventions given to them.

The SPSS 26 software was used to calculate the obtained values. The objectives of this study were to find out the effectiveness of Pilates and breathing exercises in improving the quality of life and sleep quality in medical college students with premenstrual syndrome. The results were analysed on the baseline data obtained pre and post intervention using Sf 36 quality of life questionnaire and Pittsburgh sleep quality index. After eight weeks of the intervention, the experimental group has been significantly improved ($p<0.05$) in the mean score of the sf 36 quality of life and Pittsburgh sleep quality index. There was no significant difference in control group. The effect of intervention on the changes from pre and post-test value in both groups (for within group) were analysed using Paired "t" test analysis and Unpaired sample "t" test for between groups analysis. The p value is $p<0.005$. Descriptive analysis for demographic variables.

RESULTS

The difference in mean and standard deviation within the experimental group at baseline (pre-test) and after the completion of treatment(post-test).It shows that there is a statistically significant difference in all the domain of SF 36 quality of life questionnaire between the pre-test and post-test (p value <0.05) (Table 1).

Table 1: Comparison of mean and standard deviation on SF 36 quality of life within experimental group and its level of significance.

Variables	Mean± Standard deviation		t value	p-value
	Pre test	Post test		
Physical functioning	0.4152±0.8017	0.7129±0.0570	-22.713	0.000***
Role limited due to physical health	0.0265±0.0775	0.9394±0.11653	-52.209	0.000***
Role limited due to emotional problem	0.03231±0.10332	0.8849±0.13453	-39.797	0.000***
Energy fatigue	0.3523±0.0829	0.7371±0.02203	-36.389	0.000***
Emotional well being	0.3752±0.09407	0.8294±0.05648	-32.373	0.000***
Social functioning	0.50811±0.0760	0.80386±0.0619	-23.921	0.000***
Pain	0.448863±00.07537	0.7731±0.04396	-28.955	0.000***
General health	0.5416±.0861	0.7042±0.05204	-13.575	0.000***
Health changes	0.4167±0.16602	0.7258±0.09854	-12.402	0.000***

***Extremely significant

Table 2: Comparison of mean and standard deviation on Pittsburgh sleep quality index score within experimental group.

Components	Mean± Standard deviation		t value	P value
	Pre test	Post test		
C1-subjective sleep quality	1.35±0.480	0.08±0.401	7.238	0.000***
C2-sleep latency	1.67±0.475	1.24±0.498	5.658	0.000***
C3-sleep duration	1.44±0.704	1.11±0.530	3.708	0.000***
C4-sleep efficiency	0.00±0.000	0.00±0.000	_	_
C5-sleep disturbance	1.27±0.449	1.06±0.240	3.584	0.001**
C6-sleep medication	0.00±0.000	0.00±0.000	_	_
C7-daytime dysfunction	1.08±0.267	1±0.000	2.308	0.024
Global Pittsburgh sleep quality index	6.74±1.667	5.29±.718	6.979	0.000***

***Extremely significant, **very significant

Table-3: Comparison of mean and standard deviation on SF 36 quality of life within control group.

Domains	Mean±standard deviation		t value	p-value
	Pre test	Post test		
Physical functioning	0.4220±0.07652	0.4417±0.08432	-1.521	0.133
Role limited due to physical health	0.0227±0.07242	0.3106±0.25966	-9.114	0.000***
Role limited due to emotional problem	0.03027±0.09646	0.09646±0.16529	-2.035	0.046
Energy fatigue	0.3674±0.08297	0.3758±0.07954	-0.697	0.488
Emotional well being	0.3782±0.09018	0.3852±0.09389	-0.532	0.597
Social functioning	0.51076±0.0660	0.50924±0.0682	-0.175	0.861
Pain	0.46250±0.06683	0.47159±0.06576	-1.243	0.218
General health	0.5257±0.0823	0.5288±0.08041	-0.285	0.776
Health changes	0.4053±0.16270	0.4205±0.16148	-0.759	0.451

***Extremely significant

In pre and post-test scores of global PSQI score in Subjective sleep quality (C1), sleep latency (C2), sleep duration (C3), sleep disturbance (C5) and day time dysfunction (C7) shows significant differences in experimental group. The Global Pittsburgh sleep quality index score shows the highly significance in experimental group compared to control group (Table 2).

In control Group, The mean and standard deviation within the control group at baseline (pre-test) and after the completion of treatment (post-test). Role limited due to physical health and emotional health domain shows statistically significant with the p value <0.05. All the other domains are not statistically significant due to the p value >0.05 (Table 3)

There is also significant differences noted in global PSQI score in control group with the p value equal to 0.05. The subjective sleep quality (C1) and sleep latency (C2) domain shows very significant with the p value <0.05 (Table 4).

Table 4: Comparison of mean and standard deviation on Pittsburgh sleep quality index score within control group.

Components	Mean±standard deviation		t value	P value
	Pre test	Post test		
C1-subjective sleep quality	1.33±0.475	1.14±0.460	2.723	0.008**
C2-sleep latency	1.68±0.469	1.45±0.502	3.065	0.003**
C3-sleep duration	1.52±0.662	1.39±0.653	1.305	0.197
C4-sleep efficiency	0.00±0.000	0.00±0.000	_	_
C5-sleep disturbance	1.29±0.456	1.23±0.422	0.814	0.418
C6-sleep medication	0.00±0.000	0.00±0.000	_	_
C7-daytime dysfunction	1.06±0.240	1.05±0.210	0.444	0.658
Global Pittsburgh sleep quality index	6.76±1.701	6.26±1.385	1.999	0.050*

**very significant, *significant

The post test difference in experimental and control group after eight week of assigned intervention. The experimental group has significant changes compared to control group with the p value <0.05. There is also significant difference in global Pittsburgh sleep quality index in experimental group than control group with the p value <0.005.

Difference in the means of the pre- and post-tests of SF-36 quality of life and Pittsburgh sleep quality index of the experimental group proved to be higher compared to the control group. Besides, there was a significant difference between post-tests in experimental and control groups (p<0.05).

DISCUSSION

Majority of the students belong to the mean age of 20±0.88 and this shows that the prevalence of PMS increases with the age. In India the overall estimated prevalence of PMS among Indian adolescents is 49.6% between the age limit of 10-19 years.[19] A study on reproductive and demographic predictors of premenstrual syndrome severity among university students aged between 18-25 years in Egypt reported that 47.4% of the study sample had severe premenstrual syndrome and 54.8% had family history of premenstrual syndrome.[4,19] Most of the 85 (64.4%) students were hostellers and 47 (35.6%) days scholars. This shows that hostellers have more prevalence of premenstrual syndrome comparing to days scholars. In a study conducted among dormitory students showed high prevalence of PMS and it was associated with poor sleep quality in 49.2% of students and this finding support the higher prevalence of PMS among hostellers in present study.[10,20]

Pilates exercise decreases the symptoms of PMS.[12] A study conducted on the Pilates exercises on Premenstrual syndrome (PMS) symptoms among students of Istanbul university faculty of health sciences concluded that Pilates exercise decreases the PMS symptoms. The study included a 3 months of Pilates exercise program for 3 days a week, an hour a day.[21] In the present study, the subjects in the experimental group who followed the Pilates and breathing exercise improved quality of life after the intervention. Especially the role limitation in their activities of daily living due to health problem and emotional problem and the social functioning improved significantly comparing to the pre-test evaluation done prior to the intervention.

A study to find the impact of eight weeks of Pilates training and trunk-strengthening exercises on quality of life in women with premenstrual syndrome was conducted.[22] The authors demonstrated that the Pilates group had a greater improvement in self-reported quality of life compared to the trunk strengthening exercise group.[22,23] It is important to point out that Pilates could be a complementary method of training with the potential to improve the functional capacity of individuals.[24] In agreement with the current literature, the present study finding showed significant improvement in the quality of life of subjects in experimental group after Pilates training.

In the present study, the quality of life of students in experimental group improved markedly comparing to the control group who followed eight weeks of breathing exercise. Similar to this study, a randomized controlled study carried out by Curi et al, investigated the effect of Pilates exercises on the quality of life. The result showed that there was an improvement in the quality of life among women in experimental group at the end of the exercise program.[25]

A study was conducted to analyse the effect of Pilates exercise in increasing sleep quality and reducing fatigue levels using the Pittsburgh sleep quality index (PSQI) among 67 participants. Participants received three one-hour sessions of Pilates exercise for eight-week. The variables were assessed at baseline, fourth and eight weeks. It concluded that an eight-week Pilates exercise can positively affect student's sleep quality and reduce fatigue.[19,26] This result supports the present study finding in which subjects marked improvement in their sleep quality. Improvements in the sleep quality and all the domains in Pittsburgh sleep quality index in subjects of experimental group after eight weeks of Pilates and breathing exercise have been reported.

Almost 78% of subjects with PMS were poor sleepers in the present study who had global Pittsburgh sleep quality index score of more than 8. When comparing the different PSQI components in both pre and post-test of experimental group, the strongest difference was observed in component 3 (sleep duration, $p<0.05$) and component 7 (daytime dysfunction, $p<0.05$). A study conducted in Thailand reported that women with PMS exhibit less educational activity and lack of interpersonal relationship.[25,26] Women with PMS have a poor subjective sleep quality correlating with higher anxiety and more perceived night time awakenings.[27]

Physical exercise has different biological and physiological aspects.[28] It has been suggested that increased serotonin levels due to exercise can affect circadian rhythm to improve sleep quality.[29] Pilates is a mind-body exercise approach that requires core stability, strength, flexibility and attention to muscle control, posture and breathing. As a result of the breathing in Pilates activity, sympathetic nervous system activity can decrease, and parasympathetic nervous activity increases.[30] Pilates and breathing exercise can be effectively used as a treatment strategy to reduce premenstrual syndrome thereby enhancing the quality of life and sleep quality among college students.

Limitation of the study are small sample size and, in this study, we only focused on the subject who have moderate level PMS (premenstrual syndrome scale score between 80-120). Due to study design, Subjects are not blinded and randomized.

CONCLUSION

From the analysis of data, it was concluded that performing eight weeks of Pilates and breathing exercise can positively affect student's quality of life and sleep quality significantly. It was also concluded that premenstrual syndrome were significantly decreased in experimental group when compared to control group due to the influence of 8 weeks of Pilates and breathing exercises in medical college students. Therefore, these 8 weeks exercise programs are highly recommended as suitable to found improvement in women with PMS.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institute Ethical Committee of Indira Gandhi Medical College and Research Institute on 24 August 2022 (No.403/IEC-35/IGMC&RI/PP-8/2022)

REFERENCES

1. American College of Obstetricians and Gynaecologists. Guidelines for women's health care: a resource manual. 4th ed. Washington, DC: American College of Obstetricians and Gynaecologists; 2014:607-613.
2. Arati M, Mesquita JC. Association of premenstrual syndrome with body mass index, and its effect on the quality of life: A cross-sectional study. J South Asian Fede Obstet Gynaecol. 2013;11(6):371-4.
3. Ranjbaran M, Omani Samani R, Almasi-Hashiani A, Matourypour P, Moini A. Prevalence of premenstrual syndrome in Iran: a systematic review and meta-analysis. Int J Reprod Biomed. 2017;15(11):679-86.
4. Dutta A, Sharma A. Prevalence of premenstrual syndrome and premenstrual dysphoric disorder in India: A systematic review and meta-analysis. Heal Promot Perspect. 2021;11(2):161-70.
5. Chandraratne NK, Gunawardena NS. Premenstrual syndrome: the experience from a sample of Sri Lankan adolescents. J Pediat Adolesc Gynecol. 2011;24(5):304-10.
6. Pal SA, Dennerstein L, Lehert P. Premenstrual symptoms in Pakistani women and their effect on activities of daily life. J Pak Med Assoc. 2011;61(8):763-8.
7. Bhuvaneswari K, Rabindran P, Bharadwaj B. Prevalence of premenstrual syndrome and its impact on quality of life among selected college students in Puducherry. Natl Med J India. 2019;32(1):17-9.
8. Abay H, Kaplan S. Current approaches in premenstrual syndrome management. Bezmialem Science. 2019;7(2):150-6.
9. Cakmakçi O. The effect of 8 week plates exercise on body composition in obese women. Colleg Antropolog. 2011;35(4):1045-50.
10. European Medicines Agency, 2011. Guideline on the treatment of premenstrual dysphoric disorder (PMDD) Available at: URL: http://www.ema.europa.eu/docs/en_GB/document_library/Scientificguideline/2011/08/WC500110103.pdf. Accessed 11 December 2017.
11. Green LJ, O'Brien PMS, Panay N, Craig M; on behalf of the Royal College of Obstetricians and Gynaecologists. Management of premenstrual syndrome. BJOG. 2017;124:73-105.
12. Gnanasambanthan S, Datta S. Premenstrual syndrome. Obstet Gynaecol Reprod Med. 2019;29(10):281-5.
13. Keshavarz M, Amzajerdi A, Ezati M, Sarvi F. The effect of Pilates exercise on sleep quality and fatigue among female student dormitory residents. Res Square. 2021.
14. Driver HS, Dijk DJ, Werth E, Biedermann K, Borbely AA. Sleep and the sleep electroencephalogram across the menstrual cycle in young healthy women. J Clin Endocrinol Metab. 1996;81(2):728-35.
15. Baker FC, Sassoon SA. Perceived poor sleep quality in the absence of polysomnographic sleep disturbance in women with severe premenstrual syndrome, Author Manuscript J Sleep Res. J Sleep Res. 2012;21(5):535-45.
16. Mohib A, Zafar A, Najam A, Tanveer H, Rehman R. Premenstrual Syndrome: Existence, Knowledge, and Attitude Among Female University Students in Karachi. Cureus. 2018;10(3).

17. Niak DBŹ, Kurzawa R. The impact of premenstrual syndrome on women's quality of life -a myth or a fact? 2022;598-609.
18. Lou P. Premenstrual symptoms and academic stress in emerging adulthood women in the graduate college. 2022;
19. Karpagavalli G, Rani R. A study to assess the effect of premenstrual syndrome on quality of life among college students at Chennai. 2020;10(June):110-5.
20. Durairaj A, Ramamurthy R. Prevalence, pattern and predictors of premenstrual syndrome (PMS) and premenstrual dysphoric disorder (PMDD) among college girls. New Indian J OBGYN. 2019;5(2):93-8.
21. Connolly M. Premenstrual syndrome: an update on definitions, diagnosis and management. advances in psychiatric treatment. 2001;7(6):469-477.
22. Walsh S, Ismaili E, Naheed B, O'Brien S. Diagnosis, pathophysiology and management of premenstrual syndrome. The Obstet Gynaecol. 2015;17(2):99-104.
23. Panay N. Management of premenstrual syndrome: evidence-based guidelines. Obstet Gynaecol Reprod Med. 2011;21(8):221-8.
24. Omidali F. Effects of pilates and Vitamin E on symptoms of premenstrual syndrome. J Res Develop Nurs Midw. 2016;13(1):1-9.
25. Pedersen BK, Saltin B. Exercise as medicine - evidence for prescribing exercise as therapy in 26 different chronic diseases. Scand Journal Med Sci Sports. 2015;3:1-72.
26. Pearce E, Jolly K, Jones LL, Matthewman G, Zanganeh M, Daley A. Exercise for premenstrual syndrome: a systematic review and meta-analysis of randomised controlled trials. BJGP open. 2020;4(3).
27. Kloubec June. Pilates: how does it work and who needs it? Mus Liga Tend J. 2011;1(2):61-6.
28. Vancini RL, Rayes ABR, de Lira CAB, Sarro KJ, Andrade MS. Pilates and aerobic training improve levels of depression, anxiety and quality of life in overweight and obese individuals. Arqu De Neuro-Psiquiat. 2017;75(12):850-7.
29. Gao M, Gao D, Sun H, Cheng X, An L, Qiao M. Trends in research related to premenstrual syndrome and premenstrual dysphoric disorder from 1945 to 2018: a bibliometric analysis. Front Public Heal. 2021;9(April):1–14.
30. Cahalin LP, Braga M, Matsuo Y, Hernandez ED. Efficacy of diaphragmatic breathing in persons with chronic obstructive pulmonary disease: a review of the literature. J Cardiop Rehabilit Prevent. 2002;22(1):7-21.

Cite this article as: Banu SS, Jebakani BD, Sabitha P. Effect of pilates and breathing exercise on quality of life and sleep quality among medical students with premenstrual syndrome. Int J Reprod Contracept Obstet Gynecol 2023;12:2206-11.