



AEROBIC TRAINING V/S CTM V/S PEMF AMONG GIRLS WITH PRIMARY DYSMENORRHEA ON PAIN, MENSTRUAL DISCOMFORT AND QUALITY OF LIFE

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Abstract - Girls with primary dysmenorrhea suffer with excessive pain, hampered quality of life and sometimes disturbed psychological wellbeing. It is quite necessary to bring an interventional solution to their undesired menstrual discomfort. A total of 45 female students with primary dysmenorrhea were equally divided into 3 groups. Group 1 is PEMF group, Group 2 is Aerobic Training group and Group 3 is CTM group. The Pain intensity, quality of life, and psychological aspect were assessed pre- and post-treatment. In all outcome measures based on value of significance, the data were found normally distributed. Hence one way ANOVA and post-hoc tests were used. The study found significant differences between groups in pain intensity and physical component of quality of life (QOL) in group 3. Group 1 was also proven to reduce the menstrual distress. The present study concludes that CTM was significantly better in reducing pain and improving QoL in girls with Primary Dysmenorrhea. The PEMF was also found to provide some relief in menstrual distress in girls with primary dysmenorrhea.

Keywords - Primary Dysmenorrhea, QoL, Aerobic training, CTM, PEMF, SF-12, MDQ, VAS.

I. INTRODUCTION

Dysmenorrhea is characterized by recurring, crampy pain in the lower abdomen or pelvis that occurs before or during menstruation, significantly impacting daily life and causing absenteeism from school or work. This prevalent gynecological condition affects up to 90% of young women, particularly. There are two types: primary dysmenorrhea, which typically starts after menarche without underlying pelvic issues, and secondary dysmenorrhea, resulting from identifiable conditions. Primary dysmenorrhea's pain peaks within the first two days of menstruation, lasting 8-72 hours, and often includes systemic symptoms like nausea, vomiting, lethargy, and headaches, all of which can disrupt daily activities. [6]

Research suggests aerobic exercise reduces the prevalence and symptoms of primary dysmenorrhea. Studies have shown high-intensity aerobic training (HIAT) effectively decreases pain intensity and improves quality of life. A regimen of supervised and unsupervised HIAT over seven months demonstrated significant benefits. However, gaps remain in understanding HIAT's impact on absenteeism, academic performance, and cost-effectiveness in university students with primary dysmenorrhea. Additionally, the physiological mechanisms behind aerobic exercise's pain-relieving effects in this context require further investigation. [7-11]

Connective tissue massage (CTM) is a therapy form used to treat various conditions, including primary dysmenorrhea. Developed by Elizabeth Dicke in 1935, CTM originated from her personal experience with endarteritis obliterans. Dicke discovered that stroking painful areas and palpating tense skin regions eased her pain. Unbeknownst to her, her findings paralleled Henry Head's theory of reflexive zones. Through her technique, Dicke pioneered a unique approach to pain relief.

Henry Head's theory proposes that internal organ diseases can cause heightened sensitivity in specific skin areas sharing the same embryonic origin and neural pathways. He mapped these skin zones to identify correlations between surface areas and internal organs. Building on this concept, Elizabeth Dicke developed a massage technique targeting these skin areas to reflexively influence corresponding internal organs, aiming to promote therapeutic benefits. ^[12]

Pulsed Electromagnetic Field (PEMF) therapy is a valuable treatment modality in physical therapy, offering benefits for various conditions. Its effects include vasodilation, pain relief, anti-inflammatory action, and reduction of swelling. As a non-invasive and safe method, PEMF directly targets the source of pain and inflammation. Its therapeutic benefits encompass pain reduction, decreased inflammation, enhanced wound healing, improved immune response, and accelerated recovery of bone and nerve tissues.

A study to investigate the effect of PEMF in treatment of primary dysmenorrhea concluded that PEMF appears to be effective in treatment of primary dysmenorrhea, providing an effective, safe, low-cost and successful alternative rather than pharmacological treatment ^[13]. The purpose of this study is to assess this therapeutic treatment and compare the results and carry out the conclusion.

Therefore the aim of the study was to compare the efficacy of aerobic training, CTM and PEMF in reducing pain & menstrual discomfort and improving quality of life among girls with primary dysmenorrhea.

Alternative Hypothesis (H₁): There is difference in the efficacy of aerobic training, CTM and PEMF on reducing pain & menstrual discomfort and improving quality of life among girls with primary dysmenorrhea.

Null Hypothesis (H₀): There is no difference in the efficacy of aerobic training, CTM and PEMF on reducing pain & menstrual discomfort and improving quality of life among girls with primary dysmenorrhea.

II. MATERIAL & METHODS

- ❖ **Research approach:** Quantitative
- ❖ **Study Design:** Comparative study
- ❖ **Research setting:** Uka Tarsadia University, Maliba campus, Bardoli, Surat, Gujarat, India.
- ❖ **Research population:** Girls with primary dysmenorrhea
- ❖ **Study duration:** 3 months
- ❖ **Selection criterion:**
 - ✚ **Inclusion criterion:**
 - Female with 18–24 years of age.
 - Experiencing regular menstrual cycles, with cycle lengths between 24 and 30 days.
 - Experiencing average menstrual pain intensity equal to or greater than 4 on a 0–10 Visual analogue Scale (VAS), Before 2 days of Menstruation and during the menstrual cycle.
 - Participant agreeing to participate with consent.
 - Satisfies the criteria in the screening form.
 - Participant able to read, understand and write English comfortably.
 - ✚ **Exclusion criterion:**
 - Pregnant females.
 - The use of oral contraceptive pills, hormonal therapy, or intrauterine devices.
 - The use of over-the-counter analgesics during menstruation to treat dysmenorrhea-associated pain but experiencing no pain relief in response to those analgesics.
 - Participation in any formal exercise program other than our protocol.
 - Use of NSAIDS.
 - Chronic degenerative disease
 - Secondary dysmenorrhea
- ❖ **Sample size:** 45
- ❖ **Sampling method:** Purposive sampling with random allocation
- ❖ **Data collection tools:** Mat, PEMF machine, Plinth, Print of questionnaire, Treadmill
- ❖ **Detailed procedure of study:**

After receiving approval from IEC samples were collected based on criterion and a written signed consent was taken. After which data collection was done before intervention. Following to that the samples was randomly allocated to either of three groups. Allocated samples received treatment as per their group for 4 weeks. Immediately after the intervention post data was collected. At the end the collected data was analyzed using SPSS version 23.

❖ **Intervention protocol:**

✚ **Group 1: Pulsed Electromagnetic Field (PEMF):** Before starting the treatment sessions, each patient was informed about the benefits of PEMF to gain her motivation and cooperation during the treatment course. Power supply: 100-240V~50-60Hz 300 VA First, each patient was asked to evacuate her bladder to be more relaxed, then she was advised to relax in side lying position. After that, one electrode was applied above supra pubic region and the other on lumbar region. Both electrodes were fixed by long strap and the apparatus was switched on and adjusted to produce frequency of 50HZ and intensity of 60 gauss. It was applied for 15-25 minute 3 days per week for 4 weeks.^[14]

✚ **Group 2: Aerobic Training:** The treadmill exercise program consisted of:
 A. Warm up phase: Warm up phase in which general stretching is included for 5 min.
 B. Active phase: Treadmill speed was increased according to Bruce protocol for 10 min.
 C. Cool down phase: Cool down period is for 10 min with appropriate stretching.

The exercise was repeated three times a week for four week.^[15]

✚ **Group 3: Connective Tissue Massage (CTM):** CTM may be applied to three sections of the back: base, thoracic and cervical, depending on the dysfunction to be treated. For dysfunctions involving pelvic organs, CTM is applied to the basic section. The basic section CTM consists of the manipulation of the following regions: sacral, lumbar, last thoracic vertebrae and subcostal region. Six different sets of strokes were used, as proposed by Ebner.¹¹ The strokes were short (approximately three cms) and long (approximately 10 cms). Each set of strokes was repeated three times, first on the right and then on the left lumbosacral and dorsal regions.

❖ **Outcome Measures:**

1. Pain intensity: Visual Analogue Scale(VAS).^[16]
2. Quality of life: SF-12. (PCS = Physical Components, MCS = Mental Components)^[17]
3. Psychological aspect: Menstrual Distress Questionnaire(MDQ).^[18]

III. DATA ANALYSIS: The data was analysed using SPSS version 23. Data analysis was done to check the effectiveness of therapeutic treatments and compare them. Normality testing was done of the dependent variables with Shapiro-wilk test. In the present study 45 participants were included. Level of significance was set as $p < 0.05$. Data was found to have normal distribution hence parametric analysis was done.

IV. RESULTS & DISCUSSION:

Table 4.1 Descriptive Statistics

Components	Group	Mean	Std. Deviation
Age	1.00	20.20	1.373
	2.00	20.00	1.512
	3.00	19.67	1.496
Height	1.00	162.00	6.130
	2.00	161.73	8.319
	3.00	161.13	6.334
Weight	1.00	52.9867	14.10177
	2.00	55.3333	1.62118
	3.00	51.2000	10.10799

Table 4.1 is displaying descriptive statistics of age, height and weight of both the groups

4.2 Results of one-way ANOVA analysis after the intervention

		Sum of Squares	Df	Mean Square	F	Sig.
VAS	Between Groups	1421.111	2	710.556	5.859	0.006
	Within Groups	5093.333	42	121.270		
	Total	6514.444	44			
SF12 - PCS	Between Groups	58.399	2	29.199	.578	0.566
	Within Groups	2122.771	42	50.542		
	Total	2181.170	44			
SF12 - MCS	Between Groups	252.742	2	126.371	2.645	0.083
	Within Groups	2006.450	42	47.773		
	Total	2259.192	44			
MDQ	Between Groups	7050.978	2	3525.489	5.740	0.006
	Within Groups	25794.933	42	614.165		
	Total	32845.911	44			

Table 4.2 displays the results of one-way ANOVA analysis with Sum of Squares, df, Mean Square, F and Sig. values.

4.3 Between group comparison of VAS, SF-12(PCS), SF-12(MCS), MDQ with Post-Hoc Analysis

Dependent Variable	(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.
Before Intervention VAS	1.00	2.00	1.00000	3.82556	0.795
		3.00	-5.00000	3.82556	0.198
	2.00	1.00	-1.00000	3.82556	0.795
		3.00	-6.00000	3.82556	0.124
	3.00	1.00	5.00000	3.82556	0.198
		2.00	6.00000	3.82556	0.124
After Intervention VAS	1.00	2.00	1.66667	4.02111	0.681
		3.00	12.66667*	4.02111	0.003
	2.00	1.00	-1.66667	4.02111	0.681
		3.00	11.00000*	4.02111	0.009
	3.00	1.00	-12.66667*	4.02111	0.003
		2.00	-11.00000*	4.02111	0.009
Before Intervention SF12 PCS	1.00	2.00	-4.01633	2.55346	0.123
		3.00	-2.28627	2.55346	0.376
	2.00	1.00	4.01633	2.55346	0.123
		3.00	1.73007	2.55346	0.502
	3.00	1.00	2.28627	2.55346	0.376
		2.00	-1.73007	2.55346	0.502
After Intervention SF12 PCS	1.00	2.00	2.15867	2.59595	0.410
		3.00	2.61067	2.59595	0.320
	2.00	1.00	-2.15867	2.59595	0.410
		3.00	.45200	2.59595	0.863
	3.00	1.00	-2.63067	2.59595	0.320
		2.00	-.45200	2.59595	0.863
Before Intervention SF12MCS	1.00	2.00	.69200	2.89165	0.812
		3.00	-1.52267	2.89165	0.601
	2.00	1.00	-.69200	2.89165	0.812
		3.00	-2.21467	2.89165	0.448
	3.00	1.00	1.52267	2.89165	0.601
		2.00	2.21467	2.89165	0.448
After Intervention SF12MCS	1.00	2.00	-2.52467	2.52382	0.323
		3.00	-5.78867	2.52382	0.027
	2.00	1.00	2.52467	2.52382	0.323

	3.00	3.00	-3.26400	2.52382	0.203
		1.00	5.78867	2.52382	0.027
		2.00	3.26400	2.52382	0.203
Before Intervention MDQ	1.00	2.00	19.60000	21.36102	0.364
		3.00	4.66667	21.36102	0.828
	2.00	1.00	-19.60000	21.36102	0.364
		3.00	-14.93333	21.36102	0.488
	3.00	1.00	-4.66667	21.36102	0.828
		2.00	14.93333	21.36102	0.488
POST_MDQ	1.00	2.00	25.93333*	9.04924	0.006
		3.00	27.13333*	9.04924	0.005
	2.00	1.00	-25.93333*	9.04924	0.006
		3.00	1.20000	9.04924	0.895
	3.00	1.00	-27.13333*	9.04924	0.005
		2.00	-1.20000	9.04924	0.895

Table 4.3 displays the results of post-hoc analysis between the groups to understand the between groups comparison among all the interventions.

A study was done to compare the effect of Aerobic training, PEMF and CTM on three groups of girls with Primary dysmenorrhea. Different outcome measures of therapeutic treatments were performed by the subjects of three groups to check the effect in three group and then compare them.

In all outcome measures the data were normally distributed. Post Hoc Analysis for Pain Intensity, according to VAS scale group 3 has significance value of 0.003 when compared with group 1 so $p < 0.05$. Whereas group 2 has significance value of 0.009 when compared with group 3 which is less than 0.05 which proves the group 3 a significantly better intervention when compared with other 3 interventions.

Descriptive statistics and Post Hoc Analysis for Quality of Life, SF-12 PCS is not significantly different when compared with other groups after the intervention. Values of SF-12 MCS is proving the group 3 a significantly better intervention when compared with other two groups.

Descriptive statistics and Post Hoc analysis of MDQ Questionnaire was suggesting that group 1 was found to have significantly better results when compared with other 2 groups.

In one study for aerobic training, The trial was able to demonstrate that exercise was significantly more effective than control in reducing pain quality, intensity, and interference at 4 weeks. This is the first randomized controlled trial to evaluate the effects of a treadmill-based exercise intervention on multiple domains affected by primary dysmenorrhea. The evidence supporting the use of aerobic exercise for managing pain, improving quality of life and improving daily functioning has been strengthened by the findings from this research.^[9] But in our study, there were no effect of aerobic training exercise (4 weeks of protocol) on reducing pain intensity significantly.

Another study shows that there could be a possible effect of CTM in reducing menstrual pain in a high proportion of women with primary dysmenorrhea^[12] and also in our study CTM is most effective in reducing pain and also some improvements in mental components.

In a study it was observed that PEMF is able to reduce pain intensity significantly^[19], whereas in our study we have observed relief in menstrual discomfort.

V. CONCLUSION: The present study concludes that CTM was significantly better in reducing pain and improving the QoL in girls with primary dysmenorrhea. PEMF was also found to provide some relief in menstrual distress in girls with primary dysmenorrhea.

❖ **Limitation:** All the outcome measures and tests were not being observed by the single observer. Study was limited to participants who were able to read & understand English language.

❖ **Future Scope:** Study of specific symptoms having more impact on quality of life should be assessed. Possibly all outcomes should be taken by same assessor in all patient. Scales/Questionnaire's used should be available in multiple languages.

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Conflicts of Interest – None.

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