



Physiotherapy

EFFECT OF SPINAL THRUST MANIPULATION VERSUS MAITLAND MOBILIZATION AT T10-L1 IN PRIMARY DYSMENORRHEA - A RANDOMIZED CONTROLLED TRIAL

Dr. Rolly Nayak,
MPT

Consultant Physiotherapist, Dr Rai Hospital Multi Specialty Hospital and Trauma Center, Sagar (M.P) 470004

Dr. Anand
Heggannavar
MPT*

Associate Professor, Department of Orthopedic manual therapy, KAHER Institute of Physiotherapy, Belagavi 590010*Corresponding Author

ABSTRACT

Background: Primary Dysmenorrhea refers to painful menstruation without any pelvic pathology. Women with this condition reported that menstruation have a negative impact on their quality of life. **Objective:** To compare the effect of Spinal thrust Manipulation versus Maitland Mobilization in subjects with primary Dysmenorrhea in terms of pain and Quality of life by using VAS and MOOS Questionnaire. Setting and design: A Randomized controlled study was conducted in tertiary health centre, Belagavi. **Methods:** Forty-two females between 19-25 years of age with Primary Dysmenorrhea were recruited and were randomly allocated in three groups. All groups received hot moist pack and deep transverse massage as a conventional therapy, in addition Group B received spinal thrust manipulation and Group C received Maitland mobilization on their 21st, 23rd and 1st day of menstrual cycle. Patients were assessed at baseline and post intervention using VAS and MOOS Questionnaire. **Results:** The Intra group analysis showed a considerable amount of change in percentage of VAS in group B and MOOS in group C ($p < 0.05$). Inter group analysis of group A and B showed statistical differences in VAS. Group C showed statistical difference in MOOS score as compare to group A. Post HOC analysis showed no significant differences in the variables. **Conclusion:** Spinal thrust manipulation and Maitland mobilization were equally effective in reducing pain and improving quality of life in subjects with primary dysmenorrhea.

KEYWORDS : primary dysmenorrhea, spinal thrust, Maitland mobilization.

INTRODUCTION

Dysmenorrhea is often outlined as painful menstruation. Majorly most of the females experience mild, moderate or severe pain throughout their menstruation¹ Dysmenorrhea refers to lower abdominal pain and back pain, in which menstrual cramps of uterine origin occurs with the onset of menstrual flow and persist for 6 to 72 hours.^{2,3} These cramps start couple of hours before menstruation and can last even up to 2–3 days. In the onset, the pain is strongest and decreases over time. Other symptoms like low back pain, diarrhea, nausea, vomiting, headache, vertigo, loss of appetite, sleeplessness, depression and anxiety can also be experienced additionally with Dysmenorrhea.^{4,5,6} There was one study which reported a 33.5 per cent incidence of dysmenorrhea among adolescent girls in India.⁷ A study was conducted in Sweden which has shown that more than 50% of all menstruating women experience some discomfort during their course of cycle.⁸ A senior obstetrician has also confirmed that 5-10 per cent of girls in their late teens are likely to have serious spasmodic dysmenorrhea that disrupts their educational and social life.⁹

The management of primary dysmenorrhea includes medical treatment, conventional treatment, and hands-on treatment as well. In women with primary dysmenorrhea, pharmacological treatment which is significantly more effective for pain relief and it includes NSAID's, COX-2, and OCP's and herbs plays vital role.^{10, 11, 17} Therapeutic treatment helps in reducing pain and reducing premenstrual symptoms to improve the quality of life. Various therapeutic modalities such as transcutaneous electrical nerve stimulation, interferential current therapy, thermotherapy cryotherapy and manual therapy.¹⁸ other methods provide therapeutic exercises, acupuncture/acupressure, therapeutic massages are been used for primary dysmenorrhea.¹⁹

There are various studies which have been conducted on exercise therapy, manual therapy and electrotherapy which concluded that there was significant improvement in dysmenorrhea pain and hence by improving the quality of life. A study was conducted to compare the effect of spinal manipulation vs. sham manipulation in 45 women with a history of primary Dysmenorrhea. This study concluded that spinal manipulation is effective and safe non-pharmacological approach for relieving pain and distress of primary Dysmenorrhea.¹⁹ Research was done in which they compared the effect of conventional TENS versus spinal mobilization on 50 adolescent girls with primary Dysmenorrhea which shows that mobilization in Dysmenorrhea helps in reducing pain immediately after the intervention.¹⁸ There is a paucity of literature which compares the effect of both the therapies together. So

the present study intends to compare the effect of Spinal Thrust Manipulation versus Maitland Mobilization at T10-L1 in primary Dysmenorrhea.

METHODS

A comparative, Prospective, Randomized controlled trial conducted on participants with primary dysmenorrhea, from February 2020 to March 2021. A single trained investigator evaluated all participants and collected all the data to eliminate inter-investigator error. The present study was approved by the Institutional Research and Ethics Committee (Research and ethical committee, KIPT/754/09/08/2020). The trial is registered under the clinical trial registry of India with trial number CTRI/2020/10/28586.

A total sample of 42 females was taken in the study. The sample size was calculated with the help of this formula $2(s^2)(Z_{\alpha} + Z_{\beta})^2$ All the

participants were explained the study procedures, which were designed according to the ethical standards of World Health Organization (WHO). Participants were randomly allocated by means of opaque envelopes to all the three treatment Groups namely Group A (Control Grp n= 14), Group B (Manipulation Grp n= 14) and Group C (Mobilization Grp n= 14). All participants were scrutinized based on the inclusion and exclusion criteria before their enrollment into the study. Informed written consent was obtained from all the participants prior to inclusion.

Participants aged between 19 to 25 years with primary Dysmenorrhea, whose cycles were regular, willing to participate, who score VAS ≥ 5 for Lower Abdominal or pelvic pain associated with onset of menstruation lasting for 8-72 hours with primary Dysmenorrhea were included in this study. Presence of any chronic pelvic pathology, history of any systemic conditions and any intra-uterine device and oral contraceptives, Participants with regular history of exercises were excluded from the study.

Participant assessment of VAS and MOOS questionnaire was taken twice: prior to the study and one day after finishing the intervention. VAS is a straight horizontal line of fixed length, usually 100mm where pain was measured from left (no pain) to right (worst pain). The participants were asked to mark the current state of their perception of pain. Another measure MOOS was taken to measure the quality of life with the help of administered English version of questionnaire as every participant was literate. Before giving the questionnaire to the subject therapist has explained the all the points which was given in the

questionnaire and then asked the subject to fill it. In total the questionnaire took 4-6 minutes to fill the sheet.

Intervention

The intervention period lasted for two months (3sessions) and two menstrual cycles was taken into consideration. First session was given on 21st day of the same menstrual cycle. Next session was given between 23-28th day of the same menstrual cycle. And the last session was given between 1st – 3rd days of the next menstrual cycle. The intervention was given to the subjects based on their group allocation. *Group A* received Hot Moist Pack and deep transverse massage as a conventional treatment.

The protocol was started by giving the participants hot moist pack on the lumbosacral region for 20 minutes according to the standard protocol set in place. After that the therapist performed DTM at crosswise muscle fibers as soft tissue mobilization conducted laterally from the spine. The patient was in same position and the therapist stood opposite to the treated side. Therapist's hand was placed on erector spinae muscle with thumb pointed to head. The other hand's thenar slightly pushes the mobilizing hand therefore moving it laterally together with muscles for 5 minutes both the sides.²⁰

Group B received conventional treatment along with Spinal Thrust Manipulation. Patient position was prone lying position and therapist position was walk standing position for all the three treatments. Conventional treatment was given in the same way as it is explained in the control group.

The manipulation begins at the most proximal part of the area i.e. T10 to L1. Subjects were made to lie in prone position with the arms at the side. Therapist placed their palm on the spinous process of the thoracic vertebra at T10 – L1 with one hand and the other hand placed on that and patients was asked to inhale and exhale out completely in order to remove the slack. Once the slack is removed, therapist has given high velocity, low amplitude thrust.^{21,22}

Group C received conventional treatment along with Maitland Mobilization. Conventional treatment was given in the same way as it is explained in the conventional group.

Maitland's Spinal mobilization from T10 to L1 vertebrae was given. A Posterior-Anterior glide Grade 1 and Grade 2 was given from T10 to L1 vertebrae for 2-3 per second for 30 seconds. In prone lying a pillow was given under the abdomen to make the patient more comfortable.²³

Statistical analysis was done using SPSS version 21 to analyze the collected data. Mean and standard deviation were used as statistical measures. Normality of data was done by using Kolmogorov-Smirnov test. Participant's demographic data distribution was analyzed using Kruskal Wallis Test. Comparison of the pre intervention and post intervention outcome measures within the group were done using the Wilcoxon Test. Difference between the three groups in terms of the outcome measures were analyzed using Mann Whitney Test. Post HOC analysis was done using Kruskal Wallis Test to find the differences between the groups. Level of significance was set at $p < 0.05$.

RESULT

Table 1 shows Demographic characteristics of participants such as Age and weight.

All the 42 females were between the age group of 19 to 25 years with the mean age of 23 years. Normal distribution of age with no statistical differences was seen in all the groups ($p = 0.608$).

Average weights of participants in all the groups was not statistically significant ($p = 0.427$).

+ using Kruskal Wallis Test

Table 1 shows Demographic Characteristics of the Participants

	GROUP A	GROUP B	GROUP C	p-value
Age	23.46 1.08	23.78 0.89	23.42 0.85	0.608+
Weight	59.00 12.16	55.28 10.18	60.50 9.81	0.427+

+ using Kruskal Wallis Test

Table 2 shows Intra group analysis with statistical difference observed

in the percentage of change of VAS in group B and the percentage of change in MOOS was more in group C ($p < 0.05$).

Figure 1: Consort chart



Figure1. Flow chart

Table 2 shows within group analysis for all the three groups

Groups	VAS					MOOS				
	Pre	Post	Diff	% of change	p-value	Pre	Post	Diff	% of change	p-value
Group-A	6.50 1.11	5.23 1.31	1.26 1.52	19.38 %	0.008 **	91.78 27.78	84.57 21.69	7.212 1.07	7.85% %	0.223 +
Group-B	7.08 1.01	3.47 1.97	3.60 1.94	50.84 %	0.001 **	132.64 32.17	74.42 23.50	58.21 35.42	43.88 %	0.001 **
Group-C	7.42 1.23	4.10 2.58	3.32 2.39	44.74 %	0.001 **	120.42 37.59	66.42 12.70	54.00 35.13	44.84 %	0.001 **

Table 3 showed an Inter group analysis between group A and B where a statistical differences in VAS was 0.010 in group B which is highly significant ($p < 0.05$).

Table 3 also showed a statistically significant difference in the MOOS score in group C in between group A and C with p value 0.012 which was highly significant ($p < 0.05$) as compare to other groups.

In Post HOC analysis results indicate that there was no difference in post VAS and MOOS scores across the group as the observed p value is more than 0.05 Hence all the groups were similar in reducing VAS and MOOS score. (Table 4, 5)

Table 3: Between group analysis

Variable	Time frame	Group	Mean	SD	p-value
VAS	Pre	A-GRP	6.50	1.11	0.158+
		B-GRP	7.09	1.02	
	Post	A-GRP	5.24	1.31	0.010**
		B-GRP	3.48	1.97	
	Pre	A-GRP	6.50	1.11	0.047*
		C-GRP	7.43	1.24	
	Post	A-GRP	5.24	1.31	0.156+
		C-GRP	4.11	2.58	
	Pre	B-GRP	7.09	1.02	0.431+
		C-GRP	7.43	1.24	
MOOS	Pre	B-GRP	3.48	1.97	0.475+
		C-GRP	4.11	2.58	
	Post	A-GRP	5.24	1.31	0.001**
		B-GRP	132.64	32.17	
	Pre	A-GRP	84.57	21.70	0.246+
		B-GRP	74.43	23.50	
	Post	A-GRP	91.79	27.79	0.030**
		C-GRP	120.43	37.59	
	Pre	A-GRP	84.57	21.70	0.012**
		C-GRP	66.43	12.71	
	Pre	B-GRP	132.64	32.17	0.364+
		C-GRP	120.43	37.59	
	Post	B-GRP	74.43	23.50	0.273+
		C-GRP	66.43	12.71	

*. The mean difference is significant at the 0.05 level
+ using Mann Whitney Test

Table 4: Post VAS analysis

Dependent Variable	(I) group	(J) group	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
						Lower Bound	Upper Bound
Post vas	A-GRP	B-GRP	1.75714	.76404	.068+	-.1043	3.6186
		C-GRP	1.12857	.76404	.313+	-.7329	2.9900
	B-GRP	A-GRP	-1.75714	.76404	.068+	-3.6186	.1043
		C-GRP	-.62857	.76404	.691+	-2.4900	1.2329
	C-GRP	A-GRP	-1.12857	.76404	.313+	-2.9900	.7329
		B-GRP	.62857	.76404	.691+	-1.2329	2.4900

Table 5: Post MOOS analysis

Dependent Variable	(I) group	(J) group	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
						Lower Bound	Upper Bound
Post moos	A-GRP	B-GRP	10.14286	7.51075	.377+	-8.1556	28.4413
		C-GRP	18.14286	7.51075	.052+	-.1556	36.4413
	B-GRP	A-GRP	-10.14286	7.51075	.377+	-28.4413	8.1556
		C-GRP	8.00000	7.51075	.541+	-10.2985	26.2985
	C-GRP	A-GRP	-18.14286	7.51075	.052+	-36.4413	.1556
		B-GRP	-8.00000	7.51075	.541+	-26.2985	10.2985

+ using Post Hoc Test

DISCUSSION

The study evaluated the short-term effects of spinal thrust manipulation versus Maitland mobilization at T10-L1 in subjects with primary dysmenorrhea. The effect in all the groups was evaluated by using parameters such as VAS and MOOS Questionnaire to assess pain and Quality of life in women who had Primary Dysmenorrhea. The study reported that all groups and variables were clinically significant as post HOC analysis did not show any statistical significant differences between them.

Hence findings of our statistical analysis support the null hypothesis that there would be no difference in the effects of spinal thrust manipulation versus Maitland mobilization at T10-L1 in subjects with primary dysmenorrhea in terms of pain and Quality of life. So, both the techniques were helpful in reducing pain and improving quality of life. Spinal manipulation high velocity low amplitude thrust was applied on segments of T10-L1 vertebrae. Similar studies conducted have shown that the neuromechanical processes underlying the possible efficacy of spinal stimulation for dysmenorrhea may include reducing stress on the uterine broad ligament and sacral nerve roots. Based on the neurologic link between uterine function and the sacral nerve roots, a sympathetic reaction to spinal manipulation can inhibit uterine contraction while increasing blood flow to the pelvic region. 24 Since pain perception or pain threshold rise, spinal trauma changes central processing of harmless mechanical stimuli. Pressure relief during mobilization is caused by mechanoreceptor activation, which increases proprioceptive feedback to the spinal cord, inhibiting pain impulse transfer to the anterior horn cells and higher centers. 23 A study was done to check the impact of spinal manipulation v/s sham manipulation in forty five girls with a history of dysmenorrhea. The end result was measured exploitation visual analog scale, discharge distress form and circulatory plasma levels of prostaglandin's F-2a substance, 15- keto -13, 14 dihydroprostaglandin [KDPGF2A]. A study concludes that spinal manipulation can be effective and safe without the use of medication for relieving pain and distress of primary dysmenorrhea. Hence it concluded that lumbosacral manipulation showed greater improvements in terms of pain by substantially reducing the level of prostaglandins in blood plasma which further helps in reducing pain and discomfort. 23 The results of this study match with those of the present study.

Maitland mobilization was applied (grade 1 and grade 2) for pain relief

at T10-L1 vertebral levels. Passive oscillatory action relieves discomfort by stimulating mechanoreceptors in the joint area. It was found that Maitland mobilization was also effective in Primary Dysmenorrhea in pain relief. The neurophysiologic effects of spinal mobilization procedures are used to activate mechanoreceptors, which may impede the transmission of nociceptive impulses at the spinal cord or brain stem level. Another explanation may be that the joint's short amplitude gliding motions add more nutrients to the avascular tissues, aiding in nutrient exchange and providing quicker pain relief. A Quasi experimental study was done on fifty adolescent girls aged between 14-18 years in which they had compared the effect of TENS and Maitland's spinal mobilization on the 1st and 2nd day of their menstrual cycle in which they found that both the techniques were equally effective in reducing pain among adolescent girls who suffer from primary dysmenorrhea. 27 The results of this study matches with the present study.

In the present study deep transverse massage was applied to the lumbosacral structures as it helps in reducing pain and inducing relaxation to the subject by increasing blood flow and breaking down adhesions and re-aligning soft tissue, which results in relaxation of muscle and has an analgesia effect. 25 In the present study, application of hot moist pack at lumbosacral region for 20 minutes was received by all the three groups. This intervention can be used in conjunction with manual therapy to reduce pain and menstrual distress in women with Primary Dysmenorrhea. A study was done to compare the effect of yoga asanas versus Swiss ball exercise in Primary Dysmenorrhea. In total thirty females were randomly divided into both the groups and the treatment was given for 12 weeks. Level of pain and menstrual distress was documented by VAS and MOOS questionnaire at baseline and after 12 weeks post interventionally. And found that there was no statistically significant difference in between both the groups with respect to MOOS. 26 In our present study it was also seen that after giving the intervention some subjects had a negative impact on their quality of life and pain, the results of above mentioned studies are in accordance with the findings of the control group.

The limitation of the study could have been that the lacks of follow up to analyze the carry-over and long term effect of the given intervention. Minimum score of the MOOS menstrual distress questionnaire was not considered in the inclusion criteria. The study subjects were recruited only from one centre which comprises of a relatively homogenous group. Study could be done on large sample size and with different sampling techniques. Long term effects can be investigated. Blood investigations could also be added as an outcome measure to measure the level of prostaglandins in blood serum pre and post interventionally.

Hence the present study concludes that spinal thrust manipulation and Maitland mobilization at the level of T10-L1 are equally effective in reducing pain and improving quality of life in terms of VAS and MOOS questionnaire in the primary dysmenorrhea.

ACKNOWLEDGEMENTS:

Conflict of Interest: None

REFERENCES

- French L. Dysmenorrhea. American family physician. 2005 Jan 15;71(2).
- Kannan P, Chapple C, Miller D, Claydon L, Baxter G. Menstrual pain and quality of life in woman with primary dysmenorrhea: Rationale, design, and interventions of a randomized controlled trial of effects of a treadmill-based exercise intervention. *Contemp Clin Trials* 2015;42:81-89.
- Anandha L, Priy M, Saraswathi I, Saravanan A, Ramamchandran C. Prevalence of premenstrual syndrome and dysmenorrhea among female medical students and its association with college absenteeism. *Int J Biol Med Res* 2011;2(4):1011-1016.
- Mrugacz G, Grygoruk C, Siczynski P i wsp. Etiopatogeneza zespołu bolesnego miesiączkowania. *Dev Period Med* 2013;17(1):85-89.
- Eccles NK. A randomized, double-blinded, placebo-controlled pilot study to investigate the effectiveness of a static magnet to relieve dysmenorrhea. *J Altern Complement Med* 2005;11:681-7.
- Proctor M, Farquhar C. Diagnosis and management of dysmenorrhea. *BMJ* 2006;332.
- Proctor M, Farquhar C. Diagnosis and management of dysmenorrhea. *BMJ* 2008;332(7550):1134-1138.
- Burnett M, Antao V, Black A et al. Prevalence of primary dysmenorrhea in Canada. *J Obstet Gynaecol Can* 2005;27:765-770.
- Mrugacz G, Grygoruk C, Siczynski P. Wpływ doustnej antykoncepcji na profil hormonalny oraz czynność skurczową macicy u pacjentek z pierwotnym zespołem bolesnego miesiączkowania. *Nova Med* 2013;4:147-150.
- Chen C, Cho SI, Damokash AI, Chen D, Li G, Wang X, et al. Prospective study of exposure to environmental tobacco smoke and dysmenorrhea. *Environ Health Percept* 2000;108(11):1019-22.
- Harel Z. Dysmenorrhea in adolescents. *Ann NY Acad Sci*. 2008; 1135: 185-95
- Kural M, Noor NN, Pandit D, Joshi T, Patil A. Menstrual characteristics and prevalence of dysmenorrhea in college going girls. *Journal of family medicine and primary care*. 2015 Jul;4(3):426.

13. Barcikowska Z, Rajkowska-Labon E, Grzybowska ME, Hansdorfer-Korzon R, Zorena K. Inflammatory markers in dysmenorrhea and therapeutic options. *International journal of environmental research and public health*. 2020 Jan;17(4):1191.
14. Proctor M, Hing W, Johnson TC, Murphy PA. Spinal manipulation for primary and secondary dysmenorrhoea. *Cochrane Database of Systematic Reviews*. 2001(4).
15. Ohnhaus EE, Adler R. Methodological problems in the measurement of pain: a comparison between the verbal rating scale and the visual analogical scale. *Pain*. 1975; 1: 379-84.
16. Moos RH. The development of a menstrual distress questionnaire. *Psychosomatic medicine*. 1968 Nov 1;30(6):853-67.
17. Dawood MY. Primary dysmenorrhea: advances in pathogenesis and management. *Obstetrics & Gynecology*. 2006 Aug 1;108(2):428-41.
18. Tugay N, Akbayrak T, Demirtürk F, Karakaya İI, Kocaacar Ö, Tugay U, Karakaya MG, Demirtürk F. Effectiveness of transcutaneous electrical nerve stimulation and interferential current in primary dysmenorrhea. *Pain Medicine*. 2007 May 1;8(4):295-300.
19. Kokjohn K, Schmid DM, Triano JJ, Brennan PC. The effect of spinal manipulation on pain and prostaglandin levels in women with primary dysmenorrhea. *Journal of Manipulative and Physiological Therapeutics*. 1992 Jun;15(5):279-285.
20. Pickar JG. Neurophysiological effects of spinal manipulation. *The spine journal*. 2002 Sep 1;12(5):357-71.
21. Proctor ML, Hing W, Johnson TC, Murphy PA. Spinal manipulation for primary and secondary dysmenorrhoea (Cochrane Review). In: *The Cochrane Library*, Issue
22. Denise A, Holtzman, DC, Kristina L. Petrocco-Napuli, DC, MS, Jeanmarie R. Burke, PhD *Journal of Manipulative and Physiological Therapeutics Manipulation and Dysmenorrhea March/April 2008*
23. Kokjohn K, Schmid DM, Triano JJ, Brennan PC. The effect of spinal manipulation on pain and prostaglandin levels in women with primary dysmenorrhea. *Journal of Manipulative and Physiological Therapeutics*. 1992 Jun;15(5):279-285
24. Denise A. Holtzman, DC, Kristina L. Petrocco-Napuli, DC, MS, Jeanmarie R. Burke, PhD *Journal of Manipulative and Physiological Therapeutics Manipulation and Dysmenorrhea March/April 2008*
25. Goats GC. Massage--the scientific basis of an ancient art: Part 2. Physiological and therapeutic effects. *British Journal of Sports Medicine*. 1994;28(3):153-156. doi:10.1136/bjsm.28.3.153
26. Padmanabhan K, Sudhakar S, Aravind S, Kumar CP, Monika S. Efficacy of Yoga Asana and Gym Ball Exercises in the management of primary dysmenorrhea: A single-blind, two group, pretest-posttest, randomized controlled trial. *CHRISMED Journal of Health and Research*. 2018 Apr 1;5(2):118.
27. Mistry M, Vardhan V, Palekar T, Panse R. Effect of Conventional TENS versus Spinal Mobilization In Primary Dysmenorrhea In Adolescent Girls: A Comparative Study. *Int J Physiother Res*. 2015;3(5):1227-32.