Combined effect of Acupuncture and Aromatherapy on Primary Dysmenorrhea a Pilot study Effect of Acupuncture and Aromatherapy on primary dysmenorrhea

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***Abstract*:**
Background: **Menstrual pain or dysmenorrhoea is a symptom characterized by discomfort in the abdomen during menstruation. Acupuncture has been reported to be successful in treating primary dysmenorrhea. Lavender inhalation in Aromatherapy is one of the complementary therapies was effective in alleviating dysmenorrhea symptoms. This study is done to evaluate the combined effect of acupuncture and aromatherapy on individuals with primary dysmenorrhea so that it can be offered as part of the nursing care to women experiencing menstrual cramps or dysmenorrhea.**
Methods: **A total of 10 subjects were recruited who fulfilled the inclusion & exclusion criteria. Pre-assessments were recorded then acupuncture was given on the 10th day of the menstrual cycle, for 10 days where each session will be given for 20 mins and will repeat for 2 consecutive cycles. And Lavender essential oil inhalation was given on the first 3 days of the menstrual cycle for 2 consecutive cycles. Post-assessment was done three times (at 3 cycles). The tools used for screening and data collection are the Visual Analogue Scale (VAS) and Verbal Multidimensional Scoring Scale (VMSS).**
Result: **Shapiro-Wilk's test/Quantile-Quantile (QQ) plot was used to check the normality of variables. T-test/Welch's t-test is used for between-group comparison. By one-tailed paired t-test, there was a significant reduction in the mean of pre-post1 VAS which is indicated by p=0.0002 and pre and post2 ($p<0.0001$), pre and post3 ($p<0.000$), post1 and post3 ($p<0.0001$) and also a significant reduction in VMSS when the baseline is compared with post-test 1, 2 and 3 which is indicated by p=0.0003, $p<0.000$, $p<0.0001$ respectively. Also, there is a significant reduction in the mean of VMSS when post-test1 is compared to post-test3 with p-value of 0.0018.**
Conclusion: **Our study showed that there was a significant improvement in the symptoms of primary dysmenorrhea after acupuncture and aromatherapy for 3 months. Hence acupuncture and aromatherapy can be used as effective combination measures for treating primary dysmenorrhea.**
Keywords: Primary dysmenorrhea, Acupuncture, Aromatherapy, Abdominal cramps, Lavender.

I. Introduction: Dysmenorrhea can be described as painful uterine cramps of menstrual origin and is classified as primary and secondary dysmenorrhea [1]. Primary dysmenorrhea (PD) is termed painful menstruation without any pathology. Although the cause of PD is unknown, elevated endometrial prostaglandins and their metabolites are said to be the causative factor [2]. PD is the most common form of period pain and affects up to 3 quarter of women at some stage of their reproductive life. PD characteristic symptom is crampy, colicky spasms of pain in the suprapubic area, occurring within eight to 72 hours of menstruation and peaking within the first few days as menstrual flow increases. Symptoms associated with menstrual pain such as headache, nausea, vomiting, backache, lethargy, tiredness, depression, inability to concentrate on work, and diarrhoea can be explained by the entry of prostaglandins and prostaglandin metabolites into the systemic circulation [3,4]. A dysmenorrhea incidence of 33.5% among adolescent girls in India was reported by Nag George and Bhaduri found dysmenorrhea to be a common problem in India[5]. Morbidity due to dysmenorrhea represents a substantial public health burden [6].
Prostaglandins seem to be involved to a large extent in the development of myometrial hyperactivity [7]. Potent prostaglandins and potent leukotrienes play an important role in generating primary dysmenorrhea symptoms. Non-steroidal anti-inflammatory drugs (NSAIDs) are the most common pharmacologic treatment for dysmenorrhea [4].
Acupuncture is a complementary therapy involving the insertion of fine needles into the body at specific points to achieve a therapeutic effect. Acupuncture has been reported to be successful in treating primary dysmenorrhea. On a scientific basis, acupuncture causes the central nervous system to release endorphins, serotonin, and acetylcholine which results in pain reduction[8]. Pomeranz proposed that acupuncture stimulation activated A-δ and C afferent fibers in muscle. During needle stimulation of acupuncture points such as SP6, SP8, and Ren 4 signals are transmitted to the spinal cord, and via afferent pathways to the midbrain. The perception of pain emerges from the resulting flow and integration of this information among specific brain areas and leads to a change in the perception of pain. The descending pain-modulatory system is a key anatomical network that underlies the ability to change pain intensity. When the acupuncture signals reach the hypothalamus and pituitary, they trigger a neuroendocrine response due to needling. In an animal model stimulation of acupuncture points CV4, SP6, and SP8 have been shown to regulate neuro-endocrine activities including the follicle-stimulating hormone, luteinizing hormone, oestradiol, and progesterone [9].
Aromatherapy is one of the complementary therapies which use essential oils as the major therapeutic agents to treat several diseases. The essential or volatile oils are extracted from the flowers, barks, stems, leaves, roots, fruits, and other parts of the plant

by various methods. Inhalation, local application, and baths are the major methods used in aromatherapy [10]. More than 40 plant derivatives have been identified for therapeutic use, lavender, eucalyptus, rosemary, chamomile, and peppermint are the most frequently utilized extracts [11]. Lavender essential oils have been based on oil derived from English lavender (Lavandula angustifolia) [12]. The volatile compounds that comprise lavender essential oils, including linalool and linalyl acetate, have demonstrative therapeutic properties [13]. Lavender inhalation was effective in alleviating dysmenorrhea symptoms [14]. Meta-analysis of lavender alone showed that dysmenorrhea intensity was lower in a patient treated with lavender essential oil [15]. Aromatherapy can be offered as part of nursing care to women experiencing menstrual cramps or dysmenorrhea [16]. The mechanism of action of essential oils might pose formidable challenges. One plausible explanation might be the involvement of the analgesic component of essential oils including linalool for lavender, menthol for peppermint, and fenchone for fennel. Another explanation might involve the parasympathetic nervous system related to touch and smell [17]. This study investigated the combined effect of acupuncture and aromatherapy in primary dysmenorrhea.

II. Materials and methods:

Study design: The study was 3 months, pre-post experimental design, a pilot study performed in Anandamaya Nature Cure Hospital, Mijar, Moodbidri, Karnataka. The protocol followed the institutional ethical committee approval (Registration Number-EC-033), and all the patients were provided with written informed consent in their local language.

Subjects: A sample size of 30 was selected according to convenient sampling method screened for PD according to the Visual Analogue Scale and Verbal Multidimensional Scoring System and detailed history was collected. 10 subjects who were eligible were recruited for the study. Subjects were recruited, from Alva's College of Naturopathy and Yogic Sciences, Moodbidri. Informed consent was obtained from the subjects by explaining the procedure, study objectives, and study methods. Patients with any of the following conditions were excluded from the study - Any underlying pelvic pathologies, pregnancy, lactation, and other co-morbid conditions and who are not willing to participate in the study.

Inclusion criteria: The following criteria were the basis for selecting subjects:

- Female subjects of age group 18-25 years [18].
- The subjects are selected based on VAS scale scoring above 5 and a verbal multi-dimensional scoring system -VMSS with Grade 2 and above

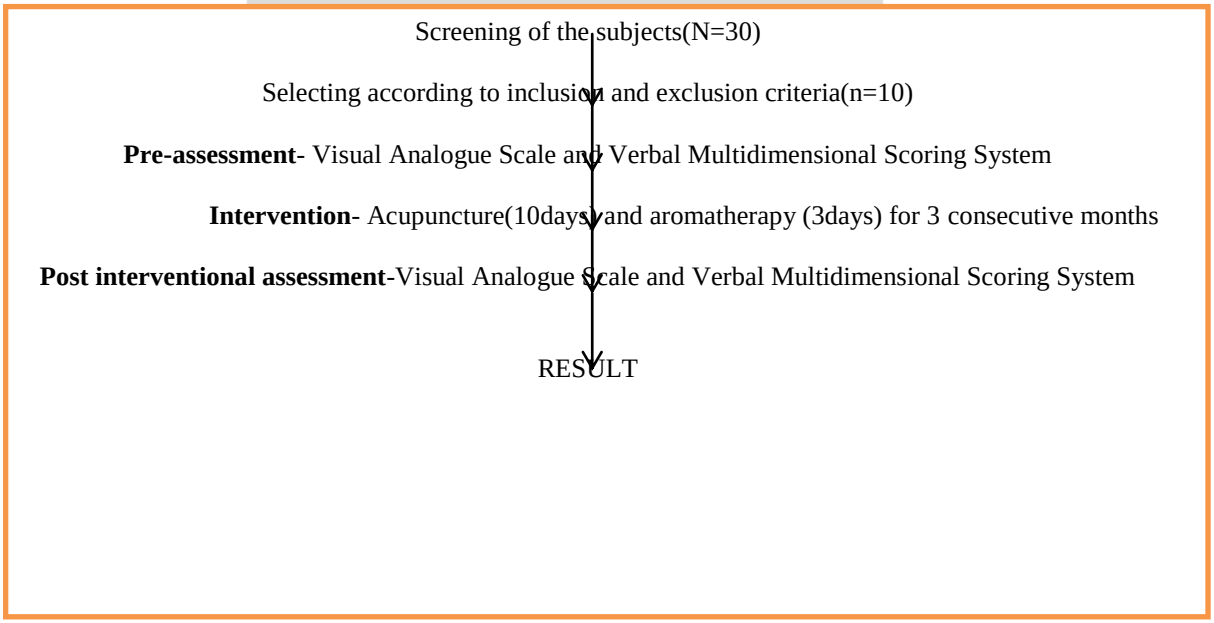
Sample size: n=10

Intervention: Subjects were given acupuncture on the 10th day of the menstrual cycle for 20 minutes for 10 days and the same was repeated for 2 consecutive cycles. Acupuncture points given were CV-4, CV-6, SP-6, SP-8, ST-29, GV-20, LI-4, LI-11 [8], and aromatherapy -Lavender essential oil of 3 drops [19] was added onto a steamer and steam inhalation for 15 minutes daily was given for the first 3 days of menstrual cycle and this was repeated for 2 consecutive cycles. No adverse events were recorded during the study.

Duration of the study: 3 months

Assessment: To assess the pain during dysmenorrhea Visual Analogue Scale (VAS) and Verbal Multidimensional Scoring System (VMSS) were used. Visual Analogue Scale (VAS) is an instrument that tries to measure a characteristic or attitude that is believed to range across a continuum of values and cannot easily be directly measured. For example, the amount of pain that a patient feels ranges across a continuum from none to an extreme amount of pain [20] Visual analogue scale (VAS) is a simple and frequently used method for the assessment of variations in the intensity of pain. In clinical practice, the percentage of pain relief, assessed by VAS, is often considered a measure of the efficacy of treatment [21] VMSS measures pain severity and takes into account the impacts of pains on daily activities, systemic symptoms, and analgesic requirements [22] Baseline data were collected before the intervention & post data was collected after each cycle of treatment up to 3 months.

Figure 1. Illustration of the study plan:



RESULTS:

Data is analyzed using **R** software version 4.0.2. There were 10 subjects in the study. Variables of both groups are given in mean ± SD. Shapiro-Wilk's test/Quantile-Quantile (QQ) plot was used to check the normality of variables. From QQ Plot, both the variables are normally distributed among pre and post-tests. t-test/Welch's t-test is used for within the group comparison at different time points. A p-value less than or equal to 0.05 indicates significance. Table 1 represents the mean and standard deviation values of the pre and post-test.

Table 1: Comparison of variables by Time points (mean±SD).

	Pre	Post 1	Post 2	Post 3
VAS	7.1±0.99	5.5±1.43	4.5±0.97	3.6±0.7
VMSS	2.2±0.63	1.3±0.82	0.5±0.53	0.3±0.48

Table 2: Significance of variables by Time points (p-value).

	VAS	VMSS
Pre – Post 1	0.0002^t	0.0003^t
Pre – Post 2	$<0.0001^t$	$<0.0001^t$
Pre – Post 3	$<0.0001^t$	$<0.0001^t$
Post 1 – Post 3	$<0.0001^t$	0.0018^t

Table 2 shows, statistical significance with $p < 0.05$, for all the variables. It indicates that there was a significant reduction in symptoms of dysmenorrhea thus proving the efficacy of the intervention. By one-tailed paired t-test, there was a significant reduction in mean of pre-test and post-test-1 VAS which is indicated by $p=0.0002$ and pre and post-test-2 ($p<0.0001$), pre and post-test-3 ($p<0.000$) and post-test-1 and post tets-3 ($p<0.0001$). Also, a significant reduction in VMSS when the baseline is compared with post-tests,1, 2, and 3 which is indicated by $p=0.0003$, $p<0.000$, and $p<0.0001$ respectively. Also, there is a significant reduction in the mean of VMSS when post-test-1 is compared to post-test-3 with p-value of 0.0018. It indicates that there is a significant reduction in dysmenorrhea after acupuncture & aromatherapy, which proves its effectiveness.

III. DISCUSSION:

The study was conducted on the subjects who had primary dysmenorrhea of grade-2 on VMSS and scored above 5 in VAS. In this study, it was found that the subjects with primary dysmenorrhea symptoms showed significant improvement following the intervention. The intervention was given for 3 months. Pre-test and post-test analysis were conducted with the VAS and VMSS. There was the reduction in symptoms like headache, fatigue, vomiting, and diarrhea which was indicated by $p<0.0001$ for VAS & VMSS when pre-test and post-test-3 were compared. Acupuncture provides effective relief from menstrual pain for women with primary dysmenorrhea. Acupuncture improved women's mood during the treatment phase. There is a substantial reduction in pain and the use of analgesics. Our study also shows the same results. Acupuncture may have a role in the management of dysmenorrhea for women who are contra-indicated to oral contraceptives or NSAIDs [9]. After each sitting of acupuncture, the subject felt relaxed and had little soreness at the site of insertion. And also noted that there is an increase in the quality of sleep. Aromatherapy also helped to improve the quality of sleep and overall sense of well-being [23]. Treatment of primary dysmenorrhea by the intradermal acupuncture method helps to regulate the Qi and blood of the meridians. This has been proved that physical acupuncture has extensively useful in the treatment of primary dysmenorrhea [24]. Inhalation of essential oils extracted from plants stimulates some olfactory receptor cells and the emotional center of the brain. A 10-minute lavender inhalation resulted in the reduction of sympathetic nervous activity. The anti-inflammatory property of lavender might be attributed to the inhibition of prostaglandin synthesis. Our present study also proves its effectiveness in primary dysmenorrhea. Aromatherapy triggers the limbic system which can result in pain reduction. Furthermore, lavender has a sedative effect that inhibits the proteinoid system involving the production of prostaglandins E2 and F2α in the uterus [25]. Previous randomized clinical trials showed that lavender inhalation relieved the severity of symptoms of dysmenorrhea such as tiredness, weakness, diarrhea, and headache [26]. Inhaled essential oil and volatile molecules from the oil will be carried to the receptor cells in the nose and attached to the hair -smooth hair. An electrochemical reaction occurs which will be transmitted through the olfactory channel to the brain and then to the limbic system which will stimulate the hypothalamus to release the hormones serotonin and endorphins, where the function of the hormone serotonin is that it can improve mood and endorphins as natural painkillers resulting in feelings of relaxation, calm and pleasure. When aromatherapy lavender is inhaled for 15-30 minutes, it can relax the muscles that are experiencing tension and open a narrow blood flow so that menstrual pain can be reduced. The main components of lavender, linalool (35%) and linalyl acetate (51%) are efficacious as analgesics [27].Improvement in the pain and other symptoms of dysmenorrhea could be possible through the central analgesic effect of acupuncture and its reflex effects on the tissues such as changes in blood flow. A previous animal study has identified biochemical and neuroanatomical substrates of acupuncture analgesia. From a biochemical perspective, it appears that acupuncture may alter the metabolism of substrates involved in the ascending facilitatory pain pathways via endogenous opioids, serotonin, and norepinephrine. From a neuroanatomical perspective, several structures are involved in acupuncture analgesia like periaqueductal gray matter, nucleus raphe Magnus, locus coeruleus, arcuate nucleus, amygdala, and nucleus accumbens. In a previous study, stimulation of acupuncture points through needling was shown to trigger the release of enkephalins and endorphins in the periaqueductal gray, arcuate nucleus, and caudate nucleus. These structures send projections to the spinal dorsal horn via dorsal lateral funiculi. Increases in serotonin release at nucleus raphe magnus and norepinephrine release in locus coeruleus are also crucial for acupuncture-induced analgesia in dysmenorrhea [28].

V. CONCLUSION:

Our study showed significant improvement in the symptoms of primary dysmenorrhea after acupuncture and aromatherapy for 3 months. Hence combined treatment with acupuncture and aromatherapy can be used as effective measures for treating primary dysmenorrhea. It is one of the safe and effective methods, which can help in minimizing the use of analgesics and their undesirable effects on the body. Further studies with larger sample size and with a control group are to be conducted for stronger evidence.

VI. REFERENCE:

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