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A LITERATURE REVIEW OF THE EFFECTIVENESS OF ACUPUNCTURE ON PRIMARY DYSMENORRHEA

by

JUNKO FUSE

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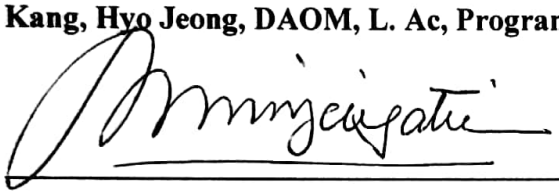
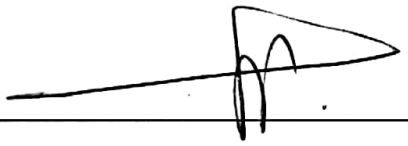
THE RESEARCH PROJECT OF JUNKO FUSE
APPROVED BY DOCTORAL RESEARCH COMMITTEE

Melen, Pia, O.M.D, L.Ac, Academic Dean

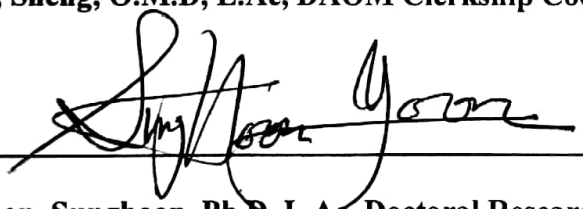
Kang, Hyo Jeong, DAOM, L. Ac, Program Director/Faculty



Sandjaya Tri, M.D., DAOM, L.Ac, Clinic Supervisor/Faculty



Li, Sheng, O.M.D, L.Ac, DAOM Clerkship Coordinator/Faculty



Yoon, Sunghoon, Ph.D, L.Ac, Doctoral Research Coordinator/Faculty

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A Literature Review of the Effectiveness of Acupuncture on Primary Dysmenorrhea

Author: Junko Fuse

SOUTH BAYLO UNIVERISTY AT ANAHEIM, 2018

Research Advisor: Dr. Qi Wei Zheng, OMD

ABSTRACT

Acupuncture is utilized in the treatment of various health problems today. Dysmenorrhea is defined as painful cramps before or during the menstruation that affect many women's quality of life. Although acupuncture is widely used in the treatment of pain control, women who experience dysmenorrhea is often underreported or do not seek medical advice. The purpose of this literature review is to study the effectiveness of acupuncture on primary dysmenorrhea, which is a dysmenorrhea without any pelvic pathology such as endometriosis. "Acupuncture AND Dysmenorrhea" was entered as key words in the data search, and 5 articles were ultimately selected for this research. Through the studies of acupuncture vs. sham as well as the decrease in NSAID intake reveal the effectiveness of acupuncture in relieving symptoms for dysmenorrhea. It is also revealed that the acupuncture treatment prior the onset of menstruation cycle was more effective than that of the onset, and the treatment stayed effective for 6 months following the treatment. The meridian often used to treat dysmenorrhea was Spleen

meridian, and the point that was most frequently selected was SP6. The finding of this review may increase more awareness to this subject, give more attention to the subject, and help more women seek for medical advice.

Keywords: Acupuncture, Dysmenorrhea

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I. INTRODUCTION

Dysmenorrhea is a medial term for the painful cramp during the menstruation cycle. It's reported by approximately 25% of women, and by up to 90% of adolescents. [1] The dysmenorrhea is divided into two types: Primary and Secondary. Primary dysmenorrhea is a painful spasmodic cramping in the lower abdomen before and or during menstruation in the absence of any pelvic pathology where as secondary dysmenorrhea is a pain that originate from identifiable pathological condition such as endometriosis. To some women, the symptoms can be more than a moderate pain as they can be minor, moderate or severe and can last from 1 to 3 days that affect the qualities of their lives.

Although the cause of the dysmenorrhea is not well established, the factors that can affect dysmenorrhea can be of age, marital status, emotions, diet, and life style. [2] Additionally, some studies have linked the pain with the increased release of prostaglandin, which then causes increased uterine contraction, ischemia in adjacent organs, and consequently the pain. Diets that are high in sugar, dairy, carbohydrates have been linked to raising the inflammatory prostaglandin levels. [3]

Due to the lack of attention to dysmenorrhea, there are limited numbers of studies that have shown the efficacy of acupuncture on this subject. Some women consider the disease as normal part of menstruation as they're often underreported. Since dysmenorrhea is chronic, affecting women only on a monthly basis, and the pain only occurs at the onset, the timing of the acupuncture treatment becomes challenging.

"I just deal with the pain" is what I often hear from my own patients when dealing with dysmenorrhea. Some women who have very severe pain are lead to missing school or work during their menstrual cycle each time [4], less physical activities, negative effect on academic performance [5, 6], poor quality of sleep [7], and even anxiety and depression. [6] The burden of dysmenorrhea is greater than any other gynecological complaint. [8] The reason why there are many patients that "just deal with the pain" however can be as a result of how poorly dysmenorrhea is treated or disregarded by health professionals, pain researchers, and the women themselves, who may accept it as a normal part of the menstrual cycle. [9] There is a great lack of attention to this subject. There are various studies that show the effectiveness of acupuncture treatment on pain management. Instead of "just deal with the pain", as many women think it's normal to have dysmenorrhea, this literature review can give some light and awareness to the subject through the comparison and analyzation of the results of acupuncture treatment on primary dysmenorrhea. The focus of this research is to show the efficacy of acupuncture treatment on dysmenorrhea through comparison between acupuncture and sham, as well as through the reduction of NSAID intake and the timing of acupuncture treatment. Acupuncture point selection in treating dysmenorrhea, sustainability of acupuncture effectiveness over time, and stimulation of needles will also be discussed.

II. LITERATURE REVIEW

Definition and Effect of Dysmenorrhea

Dysmenorrhea is one of the problems many women experience in society today. Based on pathophysiology, dysmenorrhea can be subclassified as either primary or secondary. Dysmenorrhea is defined as the presence of painful cramps of uterine origin that occur during menstruation and represents one of the most common causes of pelvic pain and menstrual disorder. [4] It's reported by approximately 25% of women, and by up to 90% of adolescents. [1] The cramp is commonly accompanied by symptoms such as nausea, vomiting, headache, migraine, dizziness, diarrhea, constipation, fatigue, or lightheadedness. [10] Primary dysmenorrhea refers to menstrual-related pain without identified organic pathology, where as secondary dysmenorrhea is menstrual pain due to an identified medical condition such as endometriosis, uterine fibroids, or pelvic inflammatory disease. [9] Dysmenorrhea results in the loss of 600 million working hours and 2 billion dollars' worth of productivity each year in the United States. [11] A study in Hong Kong used SF36 score to compare the effects of different menstruation problems such as dysmenorrhea, amenorrhea, menorrhagia and eumenorrhoeic on 235 adolescents and found that the adolescents with dysmenorrhea had the lowest quality of life scores. [12] Despite the significant effect of dysmenorrhea in their lives, most women do not seek medical advice as some studies have indicated over 90% not being reported. [13]

Primary Dysmenorrhea

Primary dysmenorrhea is defined as painful, spasmodic cramping in the lower abdomen, just before and/or during menstruation, in the absence of any discernable macroscopic pelvic pathology. [14] The onset of primary dysmenorrhea normally occurs in adolescents, shortly after 6-24 months menarche. [14] The onset of primary dysmenorrhea pain usually has a clear and predictable temporal pattern, beginning just before or at the start of menstruation. [14] The pain typically lasts for 8-72 hours, and is most severe during the first or second day of menstruation, and may radiate to the back or thighs. [14] According to "What we know about primary dysmenorrhea today: a critical review", primary dysmenorrhea, or painful menstruation in the absence of pelvic pathology, is common, and often debilitating, gynecological condition that affects between 45-95% of menstruating women. [4]

Secondary Dysmenorrhea

Secondary dysmenorrhea pain on the other hand may originate from a number of identifiable pathological conditions, including endometriosis, adenomyosis, fibroids and pelvic inflammatory disease. The onset of secondary dysmenorrhea can occur any time. Depending on the underlying condition, it can be accompanied by other gynecological symptoms such as intermenstrual bleeding and menorrhagia. [14]

Dysmenorrhea in Western Studies

The cause of primary dysmenorrhea is not well established; however, the responsible cause has been identified on the hyper-production of uterine prostaglandins,

particularly of PGF2a and PGF2, thus resulting in increased uterine tone and high amplitude contractions. [4] Once released at the onset of menstruation, they can stimulate pain neurons and induce excessive uterine contractions and adjacent organs to cause ischemia, which leads to pelvic pain. [10] Common pharmacological treatment includes the usage of Non-Steroidal Anti-inflammatory Drugs (NSAIDS) and oral contraceptives. NSAIDS are widely used as the first-line of therapy for the dysmenorrhea. [15, 16] NSAIDS inhibits activity of cyclooxygenase and thereby the synthesis of prostaglandins, which in turns help inhibit the pain. [10] The adverse effects of NSAIDS however include stomachache, diarrhea, nauseas, and liver or kidney damage after discontinuing medication. [11] The combined oral contraceptive (COC) is also suggested for the primary dysmenorrhea treatment due to its ability to suppress ovulation and reduce menstrual prostanoids. [10] The other recommended treatment methods to reduce the severity of pain in the primary dysmenorrhea include the use of calcium blockers, skin electrical stimulation, dietary supplements, exercise and massage. Most of these methods are costly and time consuming and some people refuse to use them. [17, 18]

Dysmenorrhea in TCM

Acupuncture is a component of Traditional Chinese Medicine (TCM), in which the piriform needles are inserted into the certain parts on the body as acupuncture points to stimulate the flow of energy (Qi) throughout the body, and it's widely used to treat pain symptoms. The primary concept in TCM is finding root and branch of disease. Although dysmenorrhea is often taken lightly or even ignored in Western practices, these symptoms are considered the branches of the disease, and it is essential in diagnostic

system that incorporates the pattern of differentiation to treat the individual. According to Obstetrics and Gynecology in Chinese Medicine, the Liver, Penetrating Vessel and Direction vessel are responsible for the physiology of menstruation. [19] For a normal period to occur, blood must be abundant and move adequately, and the proper movement relies on the free flow of Qi. It is further noted that the Liver-Qi and Liver-Blood is essential for a pain-free period. [20] In TCM, the primary pattern of differentiation of dysmenorrhea is often a symptom of the stagnation of Qi and/or blood, which can occur by itself or caused by cold in the uterus, damp heat or blood heat. Dysmenorrhea can also arise from deficiency, which is caused, by blood or Liver/Kidney deficiency. [20] Even in the case of deficiency when the pain is mild, however, the cause of dysmenorrhea is also from the stagnation as a result of blood failing to move freely and properly. [20] Acupuncture can be used as a line of treatment for dysmenorrhea by circulating the Qi and blood, resolve the cold, drain damp, clear heat, or tonify qi and blood.

Use of Acupuncture on Dysmenorrhea

An estimated 39.4 million US adults suffer from persistent pain, [21] and the National Institutes of Health indicate that pain affects more Americans than diabetes, heart disease and cancer combined. [22] The use of acupuncture in United States has grown and expanded rapidly, as it has tripled between 1997 and 2007; and from 1991 to 2009, 400 acupuncture research studies have been published with pain studies accounting for 41%.[23] Acupuncture involves inserting needles at various points to promote healing and improve function, and the location of points is determined by TCM diagnosis or anatomically, by using local points. In the central nervous system, needling an

acupuncture point is said to stimulate the endorphin system, altering the pain sensation. [24] Functional magnetic resonance imaging studies have also shown that the needling acupuncture points also modulates brain areas, which can affect the physiologic pain response. [25] One study has also shown that the opioid receptors are also affected at the spinal cord level. [26] The current first-line pharmacological treatment for primary dysmenorrhea is nonsteroidal anti-inflammatory drugs (NSAIDS), however, a 2013 systematic review of 11 trials with 1139 participants have shown that the acupuncture may be more effective than NSAIDS on the lower back pain treatments with fewer adverse effects. [27] These physiological changes in brain, effect on spinal cords and remarkable results from various studies have made acupuncture a unique therapeutic modality in treating pain relating to dysmenorrhea.

III. MATERIALS AND METHODS

Relevant search concerning acupuncture treatment on primary dysmenorrhea was identified by searching the databases through Pubmed, and EBSCO. The time frame for the publications of articles was set from January 2007 to November 2017. The search term "Acupuncture AND Dysmenorrhea" was used. Types of inclusion and exclusion criterias were as follow.

Inclusion Criteria:

- Effectiveness of acupuncture treatment for primary dysmenorrhea
- Years of publications: 2007 – 2017
- Randomized Controlled Trials (RCTs)

Exclusion Criteria:

- Secondary dysmenorrhea
- Moxa
- Chinese Herbs

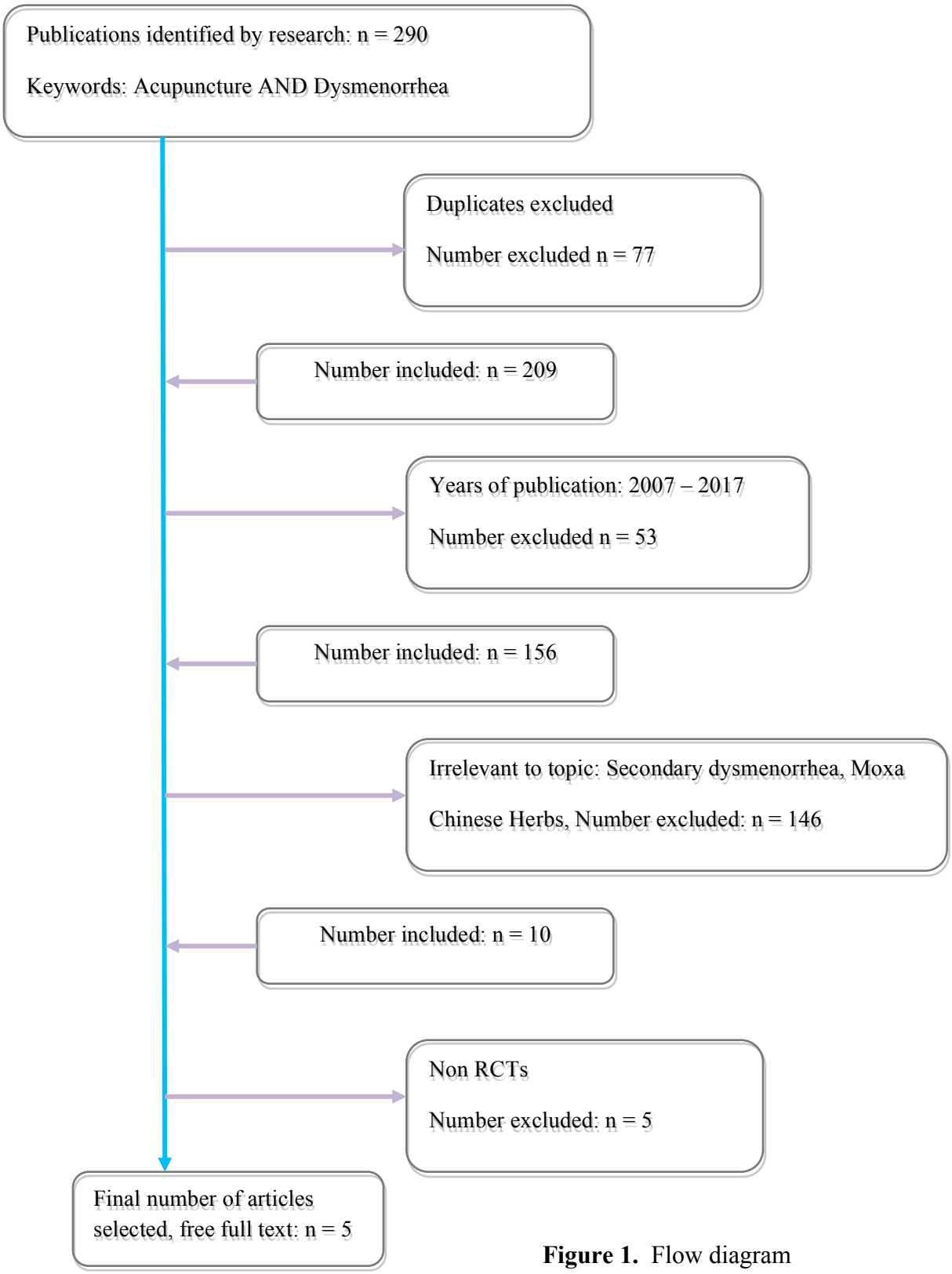


Figure 1. Flow diagram

The search process and studies included are shown in Figure 1. Initially, a total number of 290 articles were evaluated. In order to avoid missing relevant articles, the keywords were broadly set to "Acupuncture AND Dysmenorrhea". 77 duplicates were then excluded. It was narrowed down to 156 articles after setting the timeframe to last 10 years: 2007 to 2017. 146 articles were then excluded on the basis of title. Secondary dysmenorrhea, moxa, Chinese herbs and any others that were irrelevant to topic were excluded. 5 of them met the requirement of randomized controlled trials (RCTs) relevant to topic.

IV. RESULTS & DISCUSSIONS

Summary of Each Article

In a study by Bu et al, 80 patients who suffer from primary dysmenorrhea were randomly placed in three different groups: A, B, and C, and were followed for three menstrual cycles. The selected acupoints for this study were SP6, UB32, SP8 and vertebrae 17. The groups were given different time frames to be treated to see the effectiveness of acupuncture. The treatment time frames for Group A was three to seven days prior to the beginning of menstruation, and for Group B was first day of menstruation. Both groups were treated everyday until next the first day of cycle while Group C was not treated and was taken as a blank control. The results showed the decrease in the severity of symptoms in both Group A and in Group B. The CMSS scored for Group A showed 6.35 comparing to their baseline of 13.06, and 8.16 for Group B comparing to their baseline of 15.11. The decrease continued in their second cycle with 3.65 for Group A and 6.35 for Group B. Although both groups showed the decrease in symptoms, the results from Group A showed a greater decrease, while Group B showed a slight rebound in the third cycle. The score did not change much for the Group C. The study suggests that the acupuncture can significantly reduce the severity of symptoms, but the treatment prior to the onset has stronger effect than the first day of menstruation. [8]

In a study by Sriprasert et al., 52 patients were randomly assigned to receive either acupuncture or combined oral contraceptive pill, or COC group. 27 subjects received acupuncture with 20 minutes of needle retention at REN3, REN6, SP8 and SP6 while 25 subjects administered oral contraceptive pills containing 20ug ethinyl estradiol

and 150ug desogetrel. The acupuncture treatment was given on the 10th day after the first day of last menstrual period for the three consecutive menstrual cycles, 3 times a week during their cycle for 2 weeks, totaling to 18 acupuncture session. COC group were instructed to take the first pill within five days after the first day of their last menstrual period and continue taking it daily for three cycles. The pain symptoms were measured at the beginning and the end of each cycle. Result of this study has shown a tremendous improvement on quality of life for both groups with SF-36 scores improvement from baseline for ACU group (from 85.30 to 103.74) and for COC group (from 91.72 to 112.88). While the response rate of COC reached a plateau at cycle 2, ACU group gradually increased as the study progressed. The COC group experienced side effects such as vaginal bleeding, headache, weight gain, nausea or vomiting while ACU group experienced minimal side effects such as local irritation and bleeding. [28]

In a study by Smith et al, 92 patients were randomly assigned to the intervention. 46 received acupuncture while the other 46 received sham acupuncture. Both groups were treated once a week for 3 weeks with manual stimulation during 3 cycles. Aside from the primary points: SP4, ST29, REN3, BL32, SP8, SP6, additional points were selected according to the TCM diagnosis:

i. Qi and blood stagnation: LV3, SP6, LI4, REN3, UB32, SP10, REN6, SP8, SP4

ii. Qi and blood deficiency: ST36, SP6, REN3, REN4, REN6, BL17, SP8, UB20, UB32

iii. Stagnation of cold: UB23, REN3, REN6, SP6, REN4, DU4, LU7, KD6, ST36

iv. Accumulation of damp heat: GB34, LI11, LV2, ST29, UB32, ST40, SP9, ST28, SP6, UB22

v. Kidney and Liver deficiency: ST36, SP6, REN4, REN6, UB17, UB18, UB23, KD3

The sham control group followed the same treatment with blunted placebo needles that were placed 2-4cm away from the acupuncture points or meridian. 7 bilateral sham points were used without the skin penetration. Ashi points were not used. McGill Questionnaire was used to score the outcome at 3, 6, and 12 months from the trial entry. At 3 months, pain intensity was marginally lower for the acupuncture group than the sham group. There were fewer mood changes in the acupuncture group (53%) compared with control group (72%). At 6 months, reduction of the pain duration was more significant with 30 hours of pain for the acupuncture group, and 39 hours of pain for the sham group with reduced need for the analgesia in the acupuncture group (54%) compared with the control group (82%). At 12 months, no significant difference was seen. The intensity of menstrual pain, duration of pain and the symptoms reduced for both groups over time. [3]

In a study by Wu et al., 66 subjects were randomly assigned to experimental group (n = 34) and control group (n = 32). Acupoint stimulation therapy with middle-frequency electrical waves (1000Hz – 10,000Hz) were applied on LI4 and SP6 on experimental group twice weekly for 8 weeks totaling to 16 sessions, while control group received acupuncture-like transcutaneous electrical nerve stimulation on nonacupoints. Average pain score in the experimental group was considerably lower than that of control group: 2.9 compared to 5.4. Average change of total score between the two groups was also significantly different with experimental group 4.5 to control group of 1.39. [2]

In a study by Liu et al., 501 subjects were randomly assigned to the 3 groups of classic acupoint, SP6 (n = 167), unrelated acupoint, GB39 (n = 167), or non-acupoint, point anterior to GB39 (n = 167). Each group received three sessions of bilateral electrical stimulation once daily on their selected points starting on their first day of cycle for three consecutive days. The primary outcome pain was measured at 0, 5, 10, 30, and 60 minutes following the first invention using the 100-mm visual analog scale (VAS). Changes of general complaints during three menstrual cycles were compared using Cox retrospective symptom scales (RSS-Cox) and 7-point verbal rating scale (VRS). Primary comparison of VAS scores after the first intervention signified that the classic acupoint group (VAS score 29.5) was more effective than unrelated point (VAS score 37.1) or the nonacupoint (VAS score 36.1). However, no significant difference was found through RSS-Cox or VRS outcomes thus this was clinically insignificant. [29]

The Summary of these 5 articles is shown in Appendix.

Acupuncture vs. Sham

3 out of 5 studies have used the comparison between classical acupuncture points vs. sham to treat dysmenorrhea. [2, 3, 29] In the study by Smith et al. blunted placebo needles were placed 2-4cm away from the acupuncture points or meridians and measured the pain intensity using the NRS score. [3] In the study by Wu et al., the control group received acupuncture-like transcutaneous electrical nerve stimulation on nonacupoints and used MPQ-SF score to measure the pain. [2] In the study by Liu et al., the Sham group received bilateral electrical stimulation on non-acupoints and used VAS score to measure the pain. [29] Table 1 below shows the comparison between pain intensity score from these 3 studies with the usage of classical acupuncture vs. sham and reduction of pain intensity. The results form all 3 articles reveal that the acupuncture treatment is better than the sham in reducing the pain.

Table 1. Pain Intensity Score and Reduction of Acupuncture vs. Sham

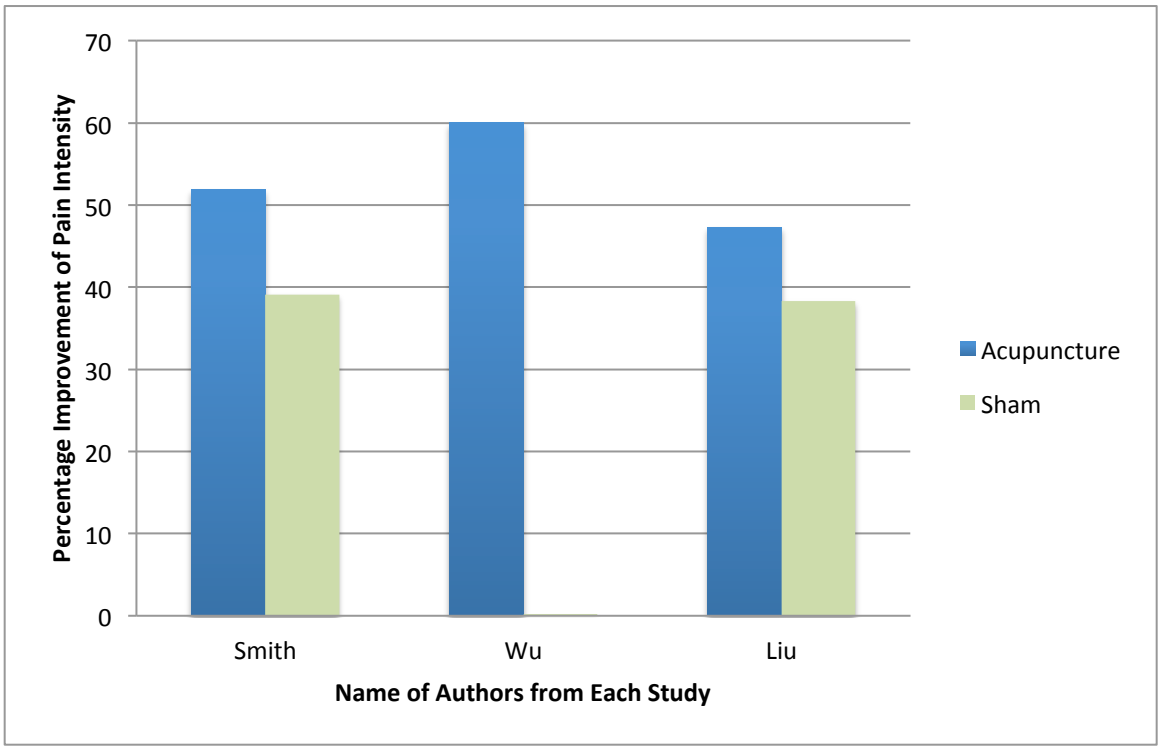
Author	Acupuncture				Sham				p-Value
	Cases	Before*	After**	Reduction	Cases	Before*	After**	Reduction	
Smith [3]	46	5.4	2.6	2.8	46	4.6	2.8	1.8	0.04
Wu[2]	34	7.5±1.5	2.9±1.2	4.5±1.9	32	7.3±1.4	5.4±2.2	1.39±2.0	< 0.001
Liu[29]	167	56	29.5	26.5	167	58.5	36.1	22.4	0.012

Before*: Before treatment; After**: After treatment

These 3 studies have used different scoring method to measure the pain, thus percentage of improvement from baseline was calculated for the comparison purpose.

Figure 2 below shows the percentage comparison of the pain intensity improvement from the baseline from the 3 studies. In all 3 studies, the acupuncture group showed more improvement from the baseline compared to the Sham. The acupuncture treatment was more effective than the Sham by 12.8% in the study by Smith et al., 59.8% more effective with Wu et al. and 9% more effective with Liu et al.

Figure 2. Percentage Improvement of Pain from Baseline Acupuncture vs. Sham



Acupuncture vs. Oral Contraceptives

Of 5 studies, 1 study compared the usage of acupuncture vs. oral contraceptives. [28] In the study of Spirasert et al., Group I was given acupuncture while Group II was given oral contraceptive (COC) pills, 20ug ethinyl estradiol and 150ug desogestrel. [28] Table 2 below summarizes the improvement in the pain score over 3 cycles, which was

measured in NRS score. The results revealed a substantial decrease in the pain score for both acupuncture and contraceptive group. The pain score for the acupuncture group decreased from 8.3, 6.5, 6.2, 6.0 from baseline to Cycle 1, 2 and 3 respectively while one from contraceptive group reduced from 7.9, 5.0, 4.0, 4.0 from baseline to Cycle 1, 2 and 3 respectively. The withdrawal rate was higher in acupuncture than the contraceptive group with acupuncture group with 6 withdrawals while only 1 dropped out from contraceptive group. Despite the higher withdrawal rate with acupuncture, results showed the efficacy of acupuncture and oral contraceptive in reducing the pain.

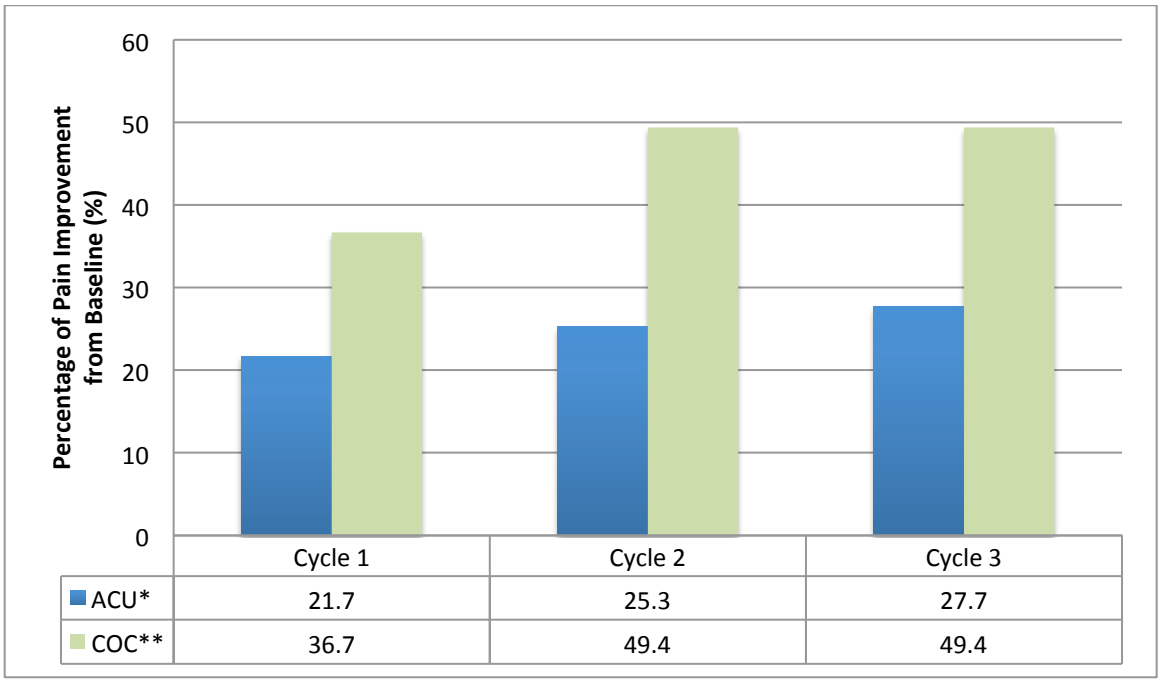
Table 2. Change in Pain Score over 3 Cycles – Acupuncture vs. Oral Contraceptive

Cycles	Acupuncture				Contraceptive				p-Value
	Cases	Before*	After**	Reduction	Cases	Before*	After**	Reduction	
Cycle 1	27	8.3	6.5	1.8	25	7.9	5.0	2.9	< 0.05
Cycle 2	27	8.3	6.2	2.1	25	7.9	4.0	3.9	< 0.05
Cycle 3	21	8.3	6.0	2.3	24	7.9	4.0	3.9	< 0.05

Before*: Before treatment; After**: After treatment

Figure 3 below summarizes the improvement of pain intensity from the baseline in percentage for Acupuncture vs. Oral Contraceptive. The study revealed that the acupuncture improved the pain intensity by 21.7%, 25.3% and 27.7% in Cycle 1, 2 and 3 respectively while it improved by 36.7%, 49.4% and 49.9% in contraceptive group. These numbers show that the acupuncture was slower in improving the pain score comparatively, however, the efficacy of acupuncture was still shown by a gradual steady increase over time while contraceptive group plateau by 2nd cycle.

Figure 3. Percentage of Improvement on Pain Intensity from Baseline in 3 Cycles



	Cycle 1	Cycle 2	Cycle 3
ACU*	21.7	25.3	27.7
COC**	36.7	49.4	49.4

ACU*: Acupuncture Group; COC**: Oral Contraceptive Group

Reduction in NSAID intake - Acupuncture vs. Contraceptive

In the study by Spirasert et al., in comparison of acupuncture vs. oral contraceptive, the groups were also given a supply of rescue NSAIDS, mefenamic acid (250mg per tablet), which was given at 1 tablet for dysmenorrhea, which was to be repeated every 4 to 6 hours on an as needed basis to reduce the pain while the groups were on acupuncture or the oral contraceptives. [28] Table 3 below summaries the reduction in NSAID consumption for both groups, which were measured in tablets. The study showed a significant decrease in the need for the NSAIDS while getting acupuncture treatment as its score was reduced from 4.1 to 2.14 tablets while the contraceptive group has decrease the consumption from 4 to 1.48 tablets. This study

shows the effectiveness of acupuncture and contraceptive in reducing the pain that lead to the decrease in NSAIDS consumption.

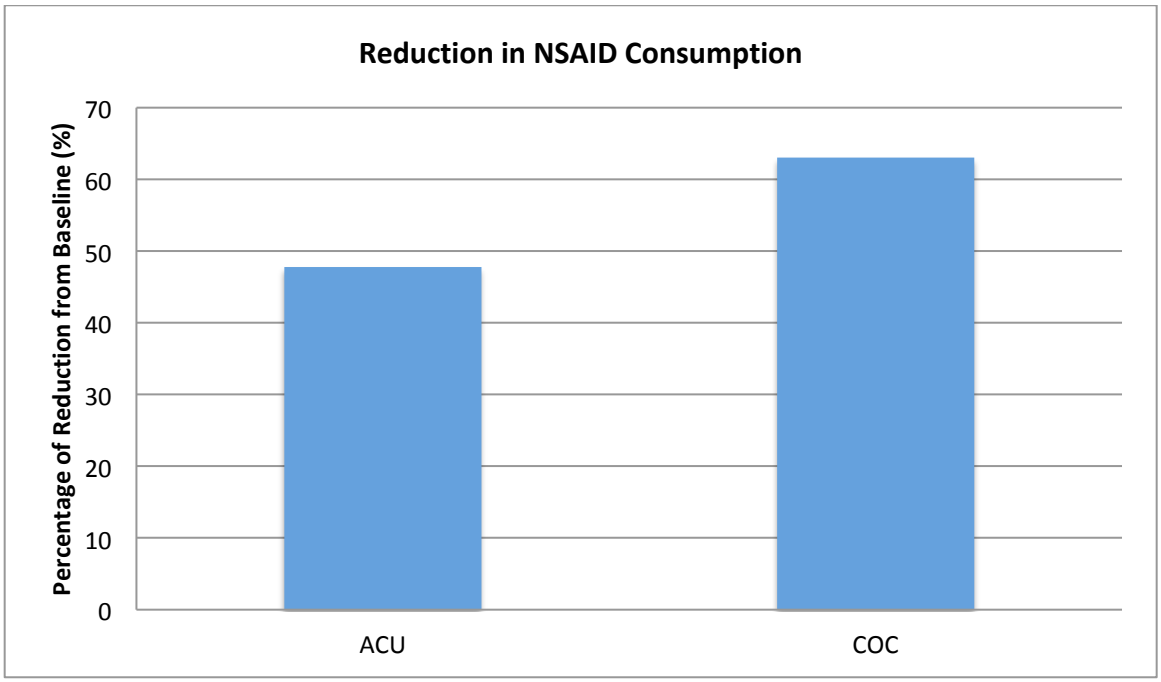
Table 3. Reduction in NSAID Consumption Acupuncture vs. Contraceptive

Author	Acupuncture				Contraceptive				p-Value
	Cases	Before*	After**	Reduction	Cases	Before*	After**	Reduction	
Spirasert et al. [28]	27	4.1	2.14	1.96	25	4	1.48	2.52	<0.05

Before*: Before Treatment; After**: After Treatment

For the comparison purpose, the results from the reduction in NSAID consumption were converted into percentage from the baseline. Figure 4 below summarizes the percentage of reductions from baseline for NSAID consumption in both ACU and COC group. The NSAID consumption was reduced by 47.8% with acupuncture while it was reduced by 63.0% with contraceptive.

Figure 4. Reduction in NSAID Consumption – Acupuncture vs. Contraceptive



Improvement in Quality of Life - Acupuncture vs. Contraceptive

In the study by Spirasert et al., the quality of life was additionally measured using SPF-36 scores. [28] Table 5 below summarizes the improvement in the score and the improvement in Acupuncture vs. Contraceptive groups. Both groups had a significant increase in the quality of life with their SF-36 score improvement from baseline with acupuncture from 85.30 to 103.74 and with COC from 91.72 to 112.88.

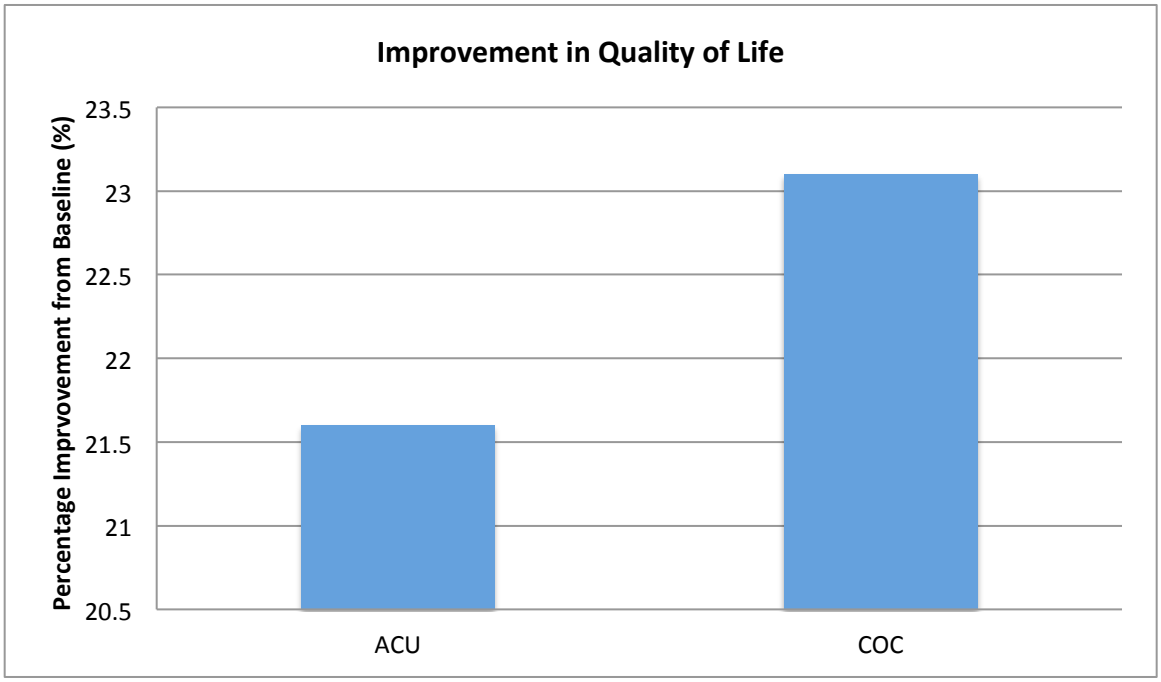
Table 4. Improvement in Quality of Life - Acupuncture vs. Contraceptive

Author	Acupuncture				Contraceptive				p-Value
	Cases	Before*	After**	Improvement	Cases	Before*	After**	Improvement	
Spirasert et al[28]	27	85.30	103.74	18.44	25	91.72	112.88	21.16	<0.0001

Before*: Before Treatment; After**: After Treatment

The SF-36 score was then converted to improvement from baseline in percentage for comparison purpose as it's shown in Figure 5 below. The quality of life was improved in both groups. It was improved by 21.6% with acupuncture and 23.1% with contraceptive. The results reveal the acupuncture and contraceptive groups can both improve the quality of life.

Figure 5. Improvement in Quality of Life - Acupuncture vs. Contraceptive



Timing of Acupuncture Treatment

Of 5 studies, 1 study has compared the timing of the treatments. [8] Acupuncture treatment was given at A) 3-7 days before menstrual cycle and B) onset of menstruation, which was then compared to C) blank control, no treatment. [8] The result was measured in CMSS score for severity of symptoms, which showed that the treatment prior to menstruation cycle has stronger effect than the onset of menstruation. The group that were treated 3-7 days before the menstrual cycle, the percentage of pain improvement continued to grow from 1st to 2nd to 3rd cycle; while the group that was treated at the onset

of menstruation only improved from 1st to 2nd cycle only. The comparison of severity in each group with timing of the treatment is shown in Table 5 below.

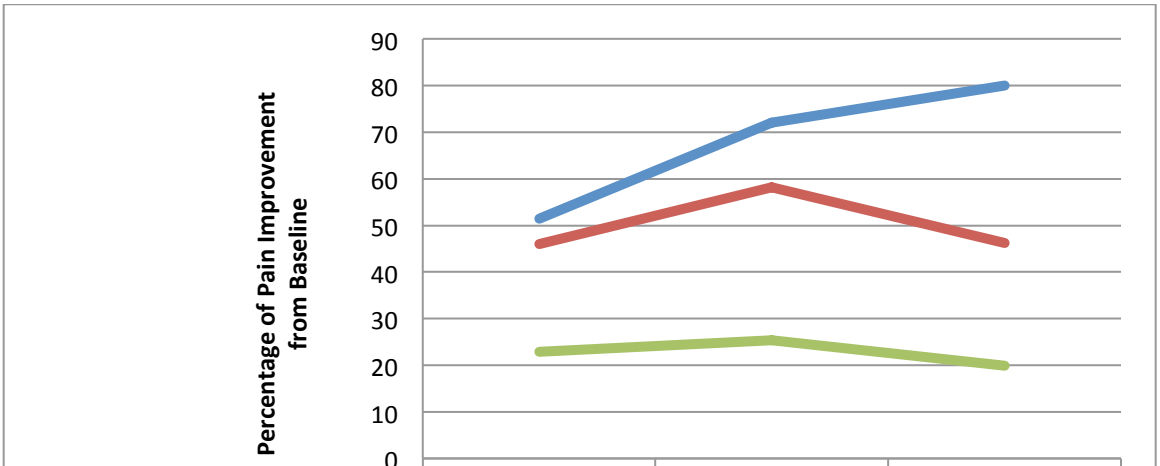
Table 5. Comparison of Severity of Symptoms with Timing of Treatment

	Cases	Baseline	1st cycle	2nd cycle	3rd cycle	p-Value
Group A	17	13.06	6.35	3.65	3.14	< 0.01
Group B	19	15.11	8.16	6.32	8.13	< 0.01
Group C	40	15.15	11.38	11.3	12.13	-

Notes: Group A: 3-7 days before menstrual cycle; Group B: Onset of Menstruation; Group C: Blank control, untreated

The percentage of improvement from the baseline from each group was calculated accordingly, in different treatment time. Group A, the group that were treated 3-7 days before the menstrual cycle, improved from severity of symptom from the baseline by 51.4% to 72.1% to 80% from Cycle 1, 2 and 3 respectively. Group B, the group that were treated at the onset of menstruation, improved from 46% to 58.2% from 1st cycle to 2nd cycle, but rebounded back to 46.2% in their 3rd cycle. Figure 6 below summarizes the percentage of improvement from the baseline.

Figure 6. Percentage of Improvement from Baseline with Timing of Treatment



	1st cycle	2nd cycle	3rd cycle
Group A (3-7 days before mense)	51.4	72.1	80
Group B (Onset of mense)	46	58.2	46.2
Group C (No Acupuncture)	22.9	25.4	19.9

Acupuncture Point Selection for Treatment

Table 6 below provides the summary of acupuncture points that were selected to treat dysmenorrhea. [2, 3, 8, 28, 29] Of 5 studies, only 1 study has chosen acupuncture points according to the TCM diagnosis. [3] 4 out 5 studies have solely used common points whereas study by Smith et al. used common points in addition to the points based on TCM diagnosis.

Table 6. Acupuncture Points Used by Each Study

	Bu[8]	Spirasert [28]	Smith[3]	Wu[2]	Liu[29]
SP4			X		
SP6	X	X	X	X	X
SP8	X	X	X		
SP9			X		
SP10			X		
Vertebrae 17	X				
REN3		X	X		
REN4			X		
REN6		X	X		
ST28			X		
ST29			X		
ST36			X		
ST40			X		
UB17			X		
UB18			X		
UB20			X		
UB22			X		
UB23			X		
UB32	X		X		
LI4			X	X	
LI11			X		
GB34			X		
GB39					X
LV2			X		
LV3			X		
DU4			X		
LU7			X		
KD3			X		
KD6			X		

Figure 7 below summarizes the most frequently used meridian to treat dysmenorrhea. The results reveal that the SP meridian was used the most with 28%. 5 out of 5 studies have chosen this meridian to treat dysmenorrhea, with addition of other meridians.

Figure 7. Frequently used Meridians to treat Dysmenorrhea

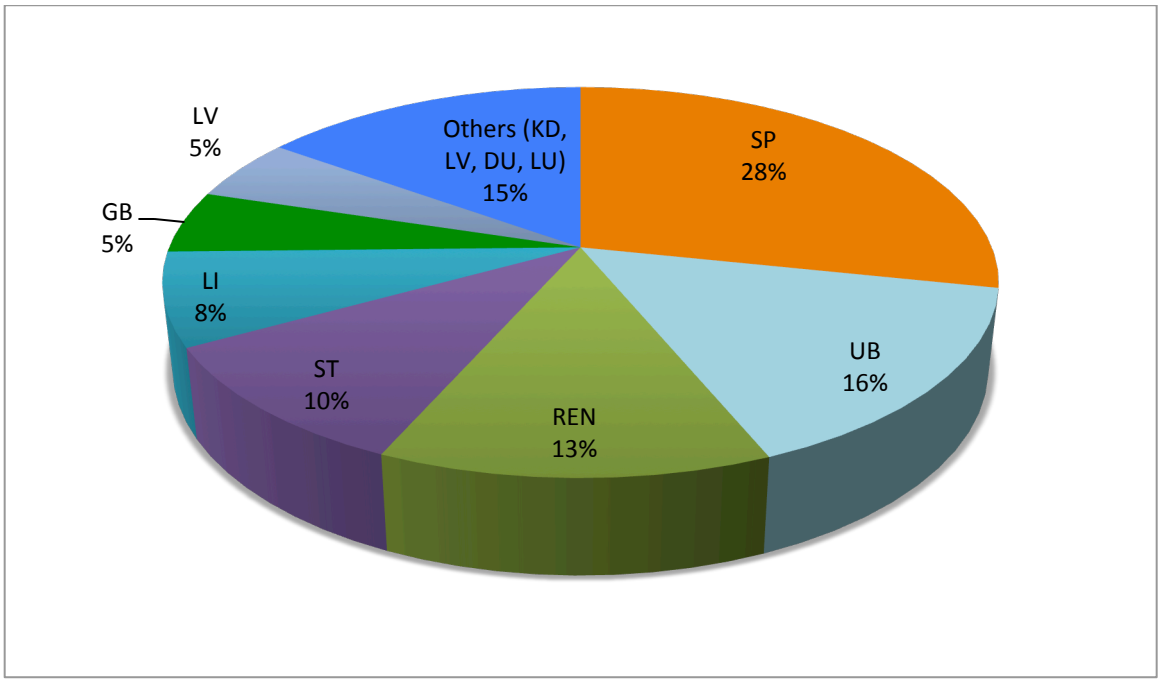


Figure 8 below shows the most frequently used point that was used within the Spleen meridian, which was the most frequently used meridian. The results reveal that the SP6 was most frequently used points with 46%, followed by SP8 with 27%.

Figure 8. Most Frequently used points within the SP Meridian

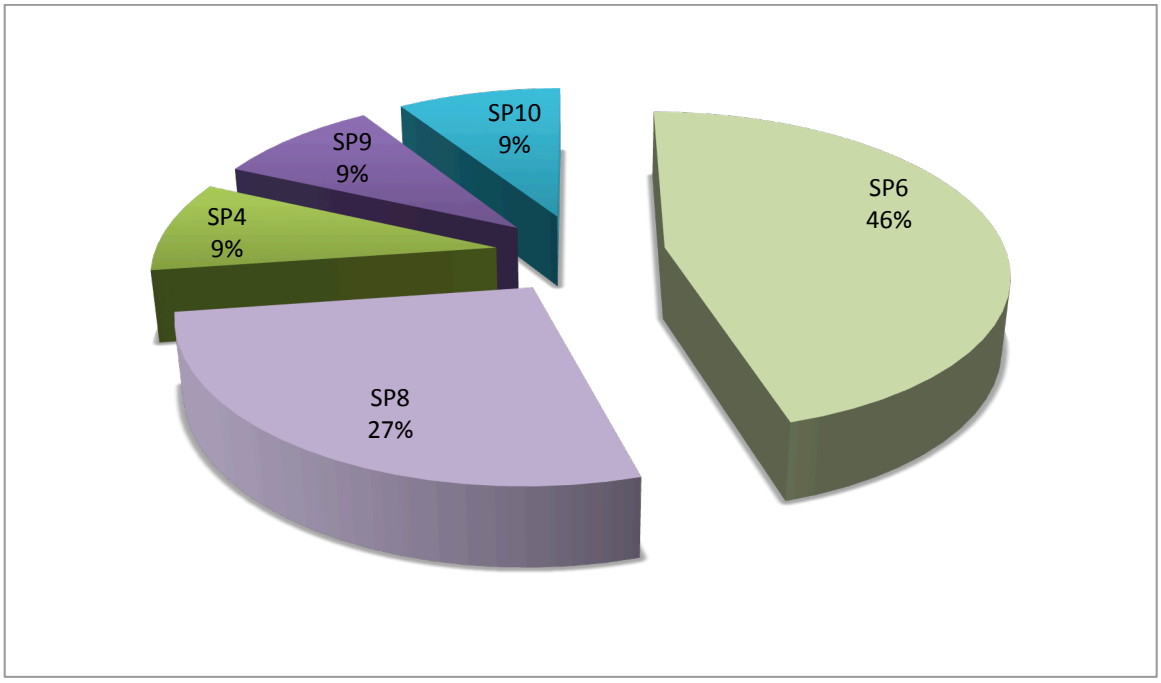
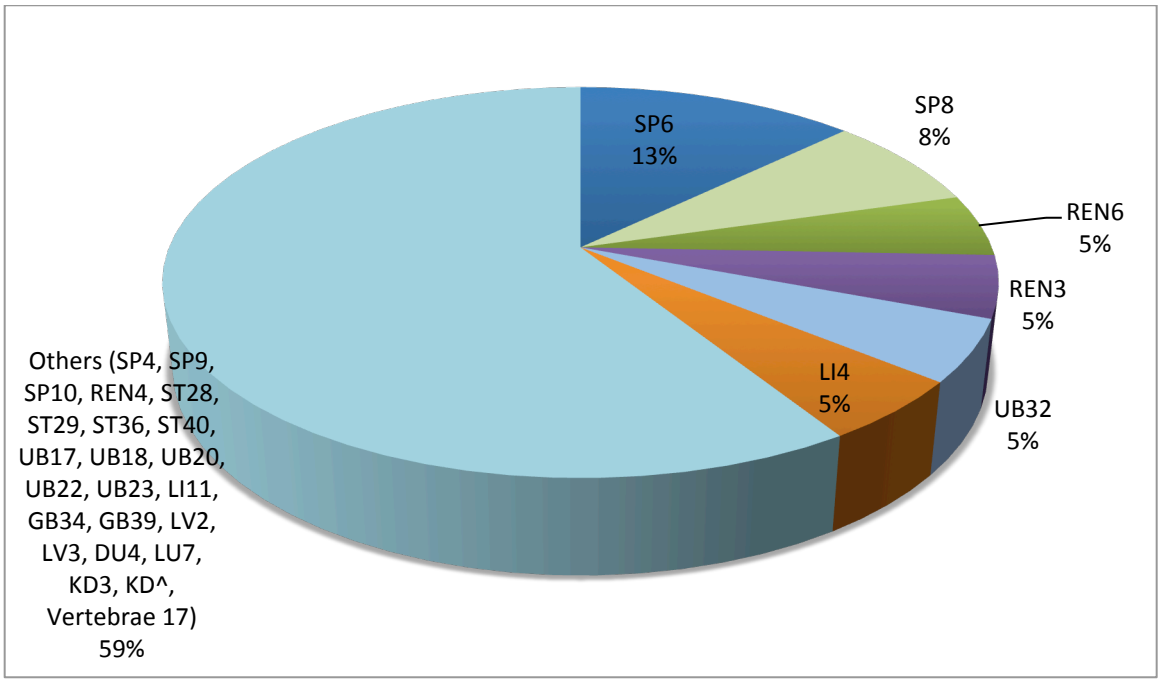


Figure 9 below shows the overall point selections. The results reveal that the SP6 was by far the one that was most frequently used with 13% as all 5 studies have used selected this point to treat dysmenorrhea. SP6 was then followed by SP8 with 8%, REN6, REN3, UB32 and LI4, each with 5%. In the study by Liu et al., SP6 was used as a classical point where as GB39 was used as non-classical point to treat dysmenorrhea and found that the SP6 was more effective in treating dysmenorrhea comparatively. [29]

Figure 9. Most Frequently Used Points to treat Dysmenorrhea



In 5 studies, SP6 was used most frequently, followed by SP8 and REN6 to treat dysmenorrhea. In treating symptoms with TCM, the selection of points differ according to diagnosis, however out of 5 studies, only 1 study has selected the point according to the TCM diagnosis. [3] The organs that are closely related to dysmenorrhea are the Liver, where the blood is stored and flow of Qi is controlled, the Spleen, where the blood is controlled, and the Kidney, where the internal organs are warmed with Ming Men fire. SP6 is called San Yin Jiao, where these 3 Yin meridians meet. The Table 7 below explains where the top 3 selected acupuncture points are located and what each one does in regards to treating dysmenorrhea.

Table 7. Acupuncture points used for treatment of dysmenorrhea [28]

Point	Location	Action
SP6 (San Yin Jiao)	3 cun proximal to the highest prominence of the medial malleolus, on the posterior border of the medial crest of the tibia	1) Resolves dampness 2) Promotes the function of the liver and the smooth flow of vital energy in the liver 3) Tonifiies the kidneys 4) Nourishes the blood and Yin 5) Regulates the uterus and menstruation 6) Moves blood and eliminates blood stasis 7) Cools blood 8) Stops pain
SP8 (Di Ji)	3 cun distal to the junction of the shaft and the medial condyle of the tibia, at the posterior border of the medial crest of the tibia	1) Regulates the uterus 2) Regulates vital energy and blood 3) Stops menstrual pain by removing blood stasis
REN6 (Qi Hai)	On the anterior midline, 1.5 cun inferior to the umbilicus or 3.5 cun superior to the upper border of the pubic symphysis	1) Tonifies and regulates vital energy 2) Resolves dampness

Sustainability of Acupuncture Over Time

Of 5 studies, 1 study followed up on the efficacy of acupuncture over time. [3] In the study by Smith et al., participants were treated with acupuncture every month for 3 consecutive months. Participants were then followed up at 6 and 12 months to see if the effectiveness was sustained. [3] Table 8 below shows the duration of pain, measured in hours, at 3 months, 6 months, and 12th months. The results showed the pain duration of 31.5 hours at 3 months, 30.7 hours at 6 months and 38.3 hours at 12 months. The efficacy of acupuncture was sustained up to 6 months from the end of the treatment but was no longer sustained at 12 months. [3]

Table 8. Duration of pain (hours) over time

Cases	Before Treatment	3 months*	6 months**	12 months***
46	37	31.5	30.7	38.3

*: 3 months after the treatment
**: Follow up at 6 months
***: Follow up at 12 months

Needle Stimulation vs. No Stimulation

3 out of 5 studies have chosen to use either electrostimulation or manual stimulation of the needles to obtain "qi" where either patient or the practitioner would feel the sensation of the energy during the treatment. [2, 8, 29] Table 9 below indicates the reduction of pain intensity with the needle stimulation, measured in CMSS, MPQ-SF and VAS respectively. The study by Bu et al. showed the reduction from 13.06 to 6.32, the study by Wu et al. showed the reduction from 7.5 to 2.9, and the study by Liu et al. showed the reduction from 64.8 to 29.5. 3 studies have reveal that the acupuncture with needle stimulation reduces the pain intensity.

Table 9. Pain Intensity Reduction - Needle Stimulation

Author	Pain Intensity Reduction from Baseline with Needle Stimulation			
	Cases	Before*	After**	Reduction
Bu et al. [8]	17	13.06	6.32	6.74
Wu et al. [2]	34	7.5	2.9	4.6
Liu et al. [29]	167	64.8	29.5	35.3

Before*: Before Treatment; After**: After Treatment

Table 10 below indicates the reduction of pain intensity without ay needle stimulation. Pain reduction was also shown from 8.3 to 6.1 from the study by Spirasert et al., measured in NRS score, and 5.4 to 2.6 from the study by Smith et al. [3, 28], measured by McGill questionnaire. The study revealed that the acupuncture without the needle stimulation also reduces the pain intensity.

Table 10. Pain Intensity Reduction – Without Needle Stimulation

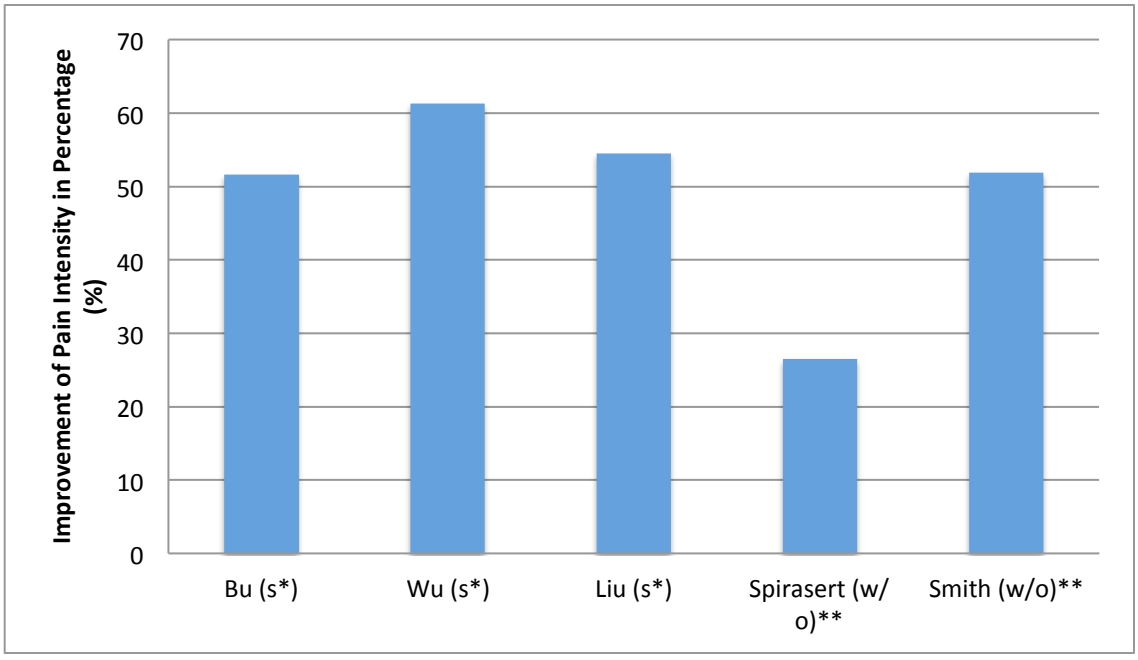
Author	Pain Intensity Reduction from Baseline without Needle Stimulation			
	Cases	Before*	After**	Reduction
Spirasert et al. [28]	27	8.3	6.1	2.2
Smith et al. [3]	46	5.4	2.6	2.8

Before*: Before Treatment; After**: After Treatment

Due to the fact that different methods were used to measure the severity of symptoms such as CMSS, MPQ-SF and VAS with needle stimulation and NRS and McGill questionnaire without the needle stimulation, the improvement from the baseline in percentage is used to compare between studies in Figure 10 below. The studies have

shown that the acupuncture reduces the pain intensity with or without the needle stimulation, but the treatment with the stimulation was better than that of without the stimulation. The pain intensity has improved by 51%, 61% and 54% with studies of Bu et al., Wu et al., and Liu et al. respectively with needle stimulation while it improved only by 26.5% with the study by Spirasert et al. [2, 8, 28, 29] Although study by Smith et al. was without the stimulation, improvement in the pain intensity of 51.9% was very comparable to those with needle stimulation. The study by Smith et al. was the only study that used the acupuncture points according to the TCM diagnosis, and this may have increased the efficacy and lead to better results.

Figure 10. Improvement in Pain Intensity – Needle Stimulation vs. No Needle Stimulation



s*: with needle stimulation; w/o**: without needle stimulation

V. CONCLUSION

Primary dysmenorrhea is a painful menses with normal pelvic anatomy that affects many women during their menstruation cycle each month. For those who avoid taking Non-Steroidal Anti-Inflammatory Drugs, NSAIDs and oral contraceptives due to side effects end up suffering through this disease as I often hear, "I just deal with it." Severe pain may lead to missing school, work, or even depression and anxiety. This disease is often underreported, and the women who suffer from the disease rarely seek for medical advice. It is often to their surprise when I mention that the acupuncture may be able to help, as many women simply are not aware of the effectiveness of acupuncture on this matter.

With keywords, "Acupuncture AND Dysmenorrhea", 5 articles were selected for this review. The age group of women for the review was 13-35. The studies have shown that the acupuncture is in fact effective in relieving the symptoms.

In this review, 3 studies have shown that the usage of actual acupuncture points was more effective in treating dysmenorrhea than the sham. 1 out of 5 studies have compared the acupuncture with oral contraceptive. Although results showed that the oral contraceptive was more effective in relieving symptoms comparatively, acupuncture also relieved the symptoms with minimal side effects such as bruising compared to more adverse effects of vaginal bleeding, headache, weight gain, nausea or vomiting with oral contraceptive. Acupuncture can be an alternative in treating primary dysmenorrhea especially with individuals who avoid taking NSAIDs or oral contraceptives or those that are contraindicated. The reduction of NSAIDS intake was further observed during this

study, and this decrease in consumption additionally reveals the effectiveness of acupuncture in the pain reduction.

Timing of acupuncture treatment was essential through the study done by Bu et al. as they found the treatment before the onset of menstruation was more effective than the one at the onset. This study has followed up on the efficacy of acupuncture treatment over time by following up at 6 and 12 months to see if the effectiveness was sustained. With this study, the effectiveness of acupuncture was sustained for 6 months, but rebounded at 12 months.

The most frequently used meridian to treat through these 5 studies were the Spleen meridian, and the most frequently used point was SP6, which is designed specifically to treat dysmenorrhea and regulate the uterus and menstruation to stop the pain. As for those who may treat dysmenorrhea with SP8, which is a He Sea point that's normally used to treat the pain, this was an interesting finding. The SP6 can be an important point to add to the treatment as 5 out of 5 studies have all selected this point to treat dysmenorrhea.

The needling technique of stimulation of needles vs. no stimulation was also additionally compared through 5 studies. The decrease in pain intensity was seen in all cases, but those with stimulation were slightly more effective in reducing the pain intensity compared to those without the stimulation. Although the study by Smith et al., was without the needle stimulation, the result was very comparative to the one with stimulation. The study by Smith et al. was the only study out of 5 studies that actually used the acupuncture points according to the TCM diagnosis, and this may have lead to the better outcome.

The limitations of this literature review lie in rather small sample size, higher withdrawal rate from the acupuncture group when they were compared with oral contraceptive. Moreover, other than 1 study by Smith et al., which used the TCM diagnosis for the point selection, only one protocol was used. Better outcome may have resulted if different points were used according to TCM diagnosis. Different pain scale was also used which made it more difficult for comparison.

With all the limitations however, acupuncture treatment reveal the efficacy in reducing the pain intensity to treat primary dysmenorrhea in all 5 studies. In order to prevent the big withdrawal from the treatment however, the patients need to be constantly encouraged to be complied with the treatment plan in the further studies. Focusing more on this subject through future studies will give more light and awareness to this subject, hoping to lead more women to seek for medical advice when dealing with dysmenorrhea, rather than "just deal with the pain".

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VII. APPENDIX

Summary of 5 Articles

Authors	Points, Stimulation	Participants	Interventions	Control, p-value	Outcome, measures
Bu et al. [8]	Points: SP6 UB32 SP8 Vertebrae 17 Manual stimulation	n = 80 (acupuncture = 40, control = 40: Group A: n = 20 Group B: n = 20 Group C: n = 40) Age = 18 – 26 yo Baseline scores Group A: 13.06 Group B: 15.11 Group C: 15.15	Group A: Treated 3-7 days before the beginning of menstruation and treated everyday until the first day of cycle for 3 courses Group B: Treated on the onset of menstruation and followed the same course as Group A	Group C: Non-acupuncture p-value: < 0.05	Comparison of CMSS score: Severity of Symptoms Group A: 1st cycle: 6.35 2nd cycle: 3.65 3rd cycle: 3.14 Group B: 1st cycle: 8.16 2nd cycle: 6.32 3rd cycle: 8.13 Group C: 1st cycle: 11.38 2nd cycle: 11.30 3rd cycle: 12.13
Spirasert et al. [28]	Points: REN3 REN6 SP8 SP6 No stimulation	n = 52 (acupuncture: n = 27 combined oral contraceptive: n = 25) age = 18 – 35 yo	Group I: Acupuncture 3 times a week for 2 weeks, starting on the 10th day from the first day of last menstrual period for the three consecutive menstrual cycles	Group II: Oral contraceptive pill: 20 ug ethinyl estradiol and 150 ug desogestrel. One pill every day for three cycles. p-value: < 0.05	Pain intensity: Acupuncture: (Comparison of NRS score) ACU group: Cycle 1: 51.85% Cycle 2: 44.44% Cycle 3: 44.44% COC group: Cycle 1: 56.00% Cycle 2: 44.00% Cycle 3: 56.00% Quality of life SF-36 score: Acupuncture: 85.3 to 103.74 COC group: 91.72 to 112.88
Smith et al. [3]	Points: SP4 ST29 REN3 UB32 SP8 SP6 + Points based on differentiation	n = 92 (acupuncture n = 46 control n = 46) Age = 14 – 25 yo	Acupuncture 9 sessions of treatment over 3 months	Sham acupuncture 7 bilateral sham points 2-4cm away from classical acupuncture points without skin penetration. 9 sessions of treatment over 3	At 3 months: Mood changes: Acupuncture (53%) Sham (72%) At 6 months: Pain duration: (Measured in McGill questionnaire) Acupuncture: 30 hours Sham: 39 hours

	No stimulation			months p-value: 0.04	Need for analgesia (measured in tablets): Acupuncture: 54% Sham: 82% At 12 months: Pain intensity (Measured in McGill questionnaire) Acupuncture: 5.4 to 2.6 Sham: 4.6 to 2.8 No significant difference was shown
Wu et al. [2]	Points: SP6 LI4 Electro stimulation	n = 66 (experimental: n = 34, control n = 32) Age Experimental: 27.0±4.6 Control: 26.9±5.4	Experimental Group: Acupuncture 16 sessions - twice weekly for 8 weeks Electro stimulation	Sham acupuncture p-value: <0.01	Average total pain score at preintervention: (MPQ-SF score) Experimental: 7.5±1.5 Control: 7.3±1.4 Changes in Average pain score Experimental: 2.9±1.2 Control: 5.4±2.2 Average change of total score: Experimental: 4.5±1.9 Control: 1.39±2.0
Liu et al. [29]	Points: SP6 GB39 Nonacu-point Electro stimulation	n= 501 classical acupoint: SP6 (n = 167) Nonclassical point: GB39 (n = 167) Nonacupoint: (n = 167) Age: 15 – 30 yo	Classical acupoint: Bilateral Electrostimulation on SP6 3 treatments once daily for 3 consecutive days starting on their first day of cycle	Nonclassical acupoint: Bilateral Electrostimulation on GB39 Nonacupoint Point anterior to GB39 p-value: 0.012	Baseline VAS score: 64.8±16.8 Decrease in pain at 5, 10, and 30 minutes: Classical acupoint: 52% Nonclassical acupoint: 46% Nonacupoint: 46% At 60 minutes: Classical acupoint: 47% Nonclassical acupoint: 36% Nonacupoint: 38% VAS score after first intervention: Classic: 29.5 Nonclassic: 37.1 Nonacupoint:36.1 No significance through RSS-Cox or VRS on pain intensity