

Non-Pharmacological Treatments of Primary Dysmenorrhea: A systematic Review

Farkhondeh Aboualsoltani ¹, Parvin Bastani ^{2*}, Laleh Khodaie ³, Seyyed Mohammad Bagher Fazljou ¹

¹ Department of Persian Medicine, School of Traditional medicine, Tabriz University of Medical sciences, Tabriz, Iran, ² Women's Reproductive Health Research Center, Tabriz University of Medical Sciences, Tabriz, Iran. ³ Department of Traditional Pharmacy, School of Traditional medicine, Tabriz University of Medical sciences, Tabriz, Iran.

Abstract

Primary dysmenorrhea is one of the most prevalent problems of women of reproductive age, which affects their quality of life and their social activity and being able to treat dysmenorrhea is very important subject of various researches. Regarding to multiple factors related to primary dysmenorrhea and importance of non-pharmacological treatment in women's state of life, this study's aim was a systematic review of papers regarding non-pharmacological treatment of primary dysmenorrhea. Non-pharmacological treatment method is one of the options of women with primary dysmenorrhea. The aim at this study is determining the concepts and definition of non-pharmacological treatments of primary dysmenorrhea according to previous studies. At first all trials (n=5462) related to keywords (treatment, therapy, painful menstruation and primary dysmenorrhea,) searched for English databases including; Google, Google scholar, PubMed, Ernbase, CINAHL, PsycInfo, and Cochrane Database of Systematic Reviews covering the period from 2010 through April 2019. Then papers related to non-pharmacological treatments for primary dysmenorrhea selected and analyzed (n=2101). Regarding to inclusion and exclusion criteria, articles related to non-pharmacological treatments of primary dysmenorrhea (Acupuncture, Heat Therapy, Psychotherapy, Massage Therapy, Hypnotism, Physiotherapy, Trans Cutaneous Electrical Nerve Stimulation(TENS)) were found and analyzed (n=12). Predefined inclusion and exclusion criteria were: papers related to non-pharmacological treatment and primary dysmenorrhea, in English, of original type, and all the papers were free full text. The PRISMA guidelines were conformed in accomplishing this review. Data were collected based on study specifications, results of non-pharmacological treatment, prevalence rates and factors related to primary dysmenorrhea. Non-pharmacological treatment for primary dysmenorrhea is so vital and can have significant role in health improvement of women. So, paying more attention to benefits of non-pharmacological treatments in primary dysmenorrhea is necessary. The results of the present study showed that all mentioned methods are effective on decreasing the severity of the symptoms of primary dysmenorrhea.

Keywords: non-pharmacological treatment, primary dysmenorrhea, Trans Cutaneous Electrical Nerve Stimulation (TENS), heat therapy, massage therapy, hypnotherapy

INTRODUCTION

One common disorder of the female reproductive system is dysmenorrhea ^[1]. Dysmenorrhea is one of the most prevalent causes of undesirable effect on women's lives, and sometimes produces activity restriction ^[2]. Dysmenorrhea is mainly classified into two types; primary and secondary. Primary dysmenorrhea is defined as painful menstruation with cramps in the pelvic area that mostly goes along with other symptoms, like nausea, vomiting, diarrhea, sweating, headache, nausea, vomiting, diarrhea, headache, sweating and shivering ^[3]. Primary dysmenorrhea or is a pain associated with menstruation without proven pelvic disease and involves approximately 50-90% of women with regular menstrual periods ^[4]. Ten percent of women suffer from severe and debilitating pain for three days which brings limitations in daily activities and social function, and even absence from school and work. For the management of primary dysmenorrhea, various methods have been proposed, including the use of nonsteroidal anti-

inflammatory drugs ^[5], contraceptive pills ^[6], and non-pharmacological methods such as herbal medicines ^[7] and acupuncture ^[8]. Due to these reasons, as well as the possible complications of the use of pharmaceutical methods, non-pharmacological treatments for primary dysmenorrhea, such as patient explanation and assertion, behavioral interventions,

Address for correspondence: Parvin Bastani, Women's Reproductive Health Research Center, Tabriz University of Medical Sciences, Tabriz, Iran.
Email: bastanip@tbzmed.ac.ir

This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 3.0 License, which allows others to remix, tweak, and build upon the work non commercially, as long as the author is credited and the new creations are licensed under the identical terms.

How to cite this article: Aboualsoltani, F., Bastani, P., Khodaie, L., Fazljou, S. M. B. Non-Pharmacological Treatments of Primary Dysmenorrhea: A systematic Review. Arch Pharma Pract 2020;11(S1):136-42.

acupressure, muscle relaxation, music therapy, guided imaging and psychometric methods, cognitive psychotherapy, the use of local heat, yoga, physiotherapy, and Trans Cutaneous Electrical Nerve Stimulation (TENS) to reduce menstrual pain^[9]. In spite of various treatments to relieve menstrual pain, there is a need to find treatments with very low or no side effect^[10].

RESEARCH BACKGROUND

LelA (2016) specified the prevalence of primary dysmenorrhea, its influence on life quality and non-pharmacological treatment methods. Dysmenorrhea and concomitant symptoms have unfavorable effect on a considerable number of students by affecting their physical, social and the academic performance. Non-pharmacological methods should be boosted more and more because they are easy to use, and without discordant side effects^[11].

Bai et al (2017) assess the effect and safety of transcutaneous electrical nerve stimulation (TENS) therapy for diminishing pain in women with primary dysmenorrhea (PD). Compared to sham TENS, real TENS showed a superior impact in pain reduction, length of being free from pain, and number of ibuprofen tablets taken ($P < 0.1$). TENS was impressive and safe in reducing the pain of participants with primary dysmenorrhea^[12].

Jo et al (2018) investigated the results of heat therapy as a treatment method for primary dysmenorrhea. Data extraction and risk of bias assessments were carried out by two independent reviewers. Risk of bias was assessed using the Cochrane risk of bias tool. However these consequences are founded on almost few clinical trials with small sample sizes. The review brought indicative clue of the advantages of heat therapy for primary dysmenorrhea, but strict high quality clinical trials are still required to put out firm evidence^[13].

Adiputri et al (2018) used lavender as tranquilizer and a medicine for soothing pain and change of pain perception. Treatment with Lavender oil using effleurage massage method impressively lowers pain severity in the pain scale^[14].

Apay et al (2012) assess the impact of aromatherapy massage on painful menstruation. In their quasiexperimental study, the placebo group was the same group of participants as intervention group. Its results showed that massage was beneficial in decreasing pain. Also the effect of aromatherapy massage was greater than placebo massage^[15].

Manei Sefat et al studied and compared the effect of Cognitive Behavioral Therapy (CBT) and hypnotherapy on menstrual pain reduction of female participants. U-Mann Whitney index showed that the pain intensity diminished significantly in both CBT and hypnotherapy groups, compared to control group, with even more reduction in hypnotherapy group^[16].

Shetty et al (2018) performed a study to determine the influence of acupuncture in the treatment of primary dysmenorrhea. This study resulted in significant decrease in all the variables including the visual analog scale score for pain, menstrual cramps, dizziness, diarrhea, headache, faint, mood shifts, fatigue, nausea and vomiting in the study group compared to control group. Acupuncture could be regarded as a useful treatment method for the controlling intensity of primary dysmenorrhea^[10].

Woo et al (2018) assess the current evidence considering the efficacy and safety of acupuncture on primary dysmenorrhea. The results of the study express that acupuncture might lower menstrual pain and related symptoms more efficiently compared to no treatment or NSAIDs, and short term follow up indicates that this efficiency is lasting. Despite restrictions because of the low quality and methodological burdens of the included studies, acupuncture might be used as beneficial and safe treatment method for those with primary dysmenorrhea^[17].

Gerzson et al (2014), in their literature review, emphasize on the positive effect and precision of specially physiotherapy and other existing non-pharmacological treatment modalities on lowering symptoms of primary dysmenorrhea. Studies were found explaining the use of thermotherapy, cryotherapy, transcutaneous electric nerve stimulation, connective tissue massage, Pilates and acupuncture, in reducing primary dysmenorrhea symptoms. However it is obvious that more studies considering physiotherapeutic maneuvers with further methodological strictness are required^[18].

Ortiz et al (2015) investigate the effectiveness of a physiotherapy plan for diminishing symptoms of primary dysmenorrhea. The physiotherapy plan contained of stretching exercises, specific stretches, Kegel exercises, jogging and relaxation practices. Patient measurements of symptoms and pain severity were evaluated for three consecutive cycles. The results, confirm that if done regularly, strengthening, stretching, muscle relaxation methods and jogging have positive effect on reducing the symptoms of primary dysmenorrhea^[19].

MATERIALS AND METHODS

In this research a systematic review of papers conducted to determine the most important non-pharmacological treatment methods of primary dysmenorrhea including acupuncture, heat therapy, psychotherapy, massage therapy, hypnotherapy, physiotherapy, trans cutaneous electrical nerve stimulation(TENS). The review included clinical trials from 2010 till April 2019).

Literature search

The method of demonstration of data in this study, including the specifying of the problem under study, data gathering, analysis and interpretation and findings are according to the systematic study reporting system i.e.PRISMA. The above determined protocol criteria were used for searching and

evaluating the articles. There was a time limit for performing electronic inquiry (2010 – April 2019). To access the required information, the papers were searched in English databases like Google, Google scholar, PubMed, Embase, CINAHL, Psycinfo, and Cochrane Database of Systematic Reviews. The keywords were: non-pharmacological treatment, menstrual pain, primary dysmenorrhea.

Inclusion and exclusion criteria

Inclusion and exclusion criteria were: articles related to non-pharmacological treatments of primary dysmenorrhea, in English language, original and free full text papers.

For increasing the search comprehensiveness and for finding other possible sources, the list of references for all papers related to our aim were managed in a handy manner. The chief inclusion criteria for the papers of this structured review were clinical trials, in English language that examined the effect of non-pharmacological treatments on primary dysmenorrhea. If there were multiple copies of a study, the most complete one would be selected. In case of the absence of the full text of the paper, the abstract was used, and if there was no adequate information in the abstract section, the paper was excluded from more inquiry. To select studies and extract information, the heading of all articles captured by two of the authors of the study and repetitive headings removed at first step. Then the title and summary of the other articles were intently studied and those not meeting the inclusion criteria of this systematic review were omitted. In the end, the full text of the probable related papers were inquired, qualified

papers were selected for the thorough examination. According to inclusion and exclusion criteria 12 papers were selected for further analysis. Data were collected considering study specifications, measures of primary dysmenorrhea, prevalence rate and features related to primary dysmenorrhea. The PRISMA guidelines were pursued in conducting this systematic review.

Data extraction

The extraction and assessing of the quality of papers was performed by two independent contributors to minimize the risk of subversion. If the papers were not considered, the reasons for excluding were explained. In cases where there was no consistency between the two contributors, the review was conducted by a third researcher. In the next stage, the information related to the selected papers, including first author's name, the time and location of the study, publication time, size of the samples and their general characteristics, non-pharmacological treatments, the scale of treatments and reported conclusions of the study were extracted. For quantitative and qualitative examining of the articles, systematic review of the choice bias (random sequence generation and allocation concealment), implementation (blindness of participants and researchers), diagnosis (blindness of statistical analysis), the number of samples excluded after randomization and reporting (selective outcomes report), were considered. For achieving this aim, the risk of bias tool of Cochrane collaboration group was applied. The selection process of the included papers depicts on Figure 1.

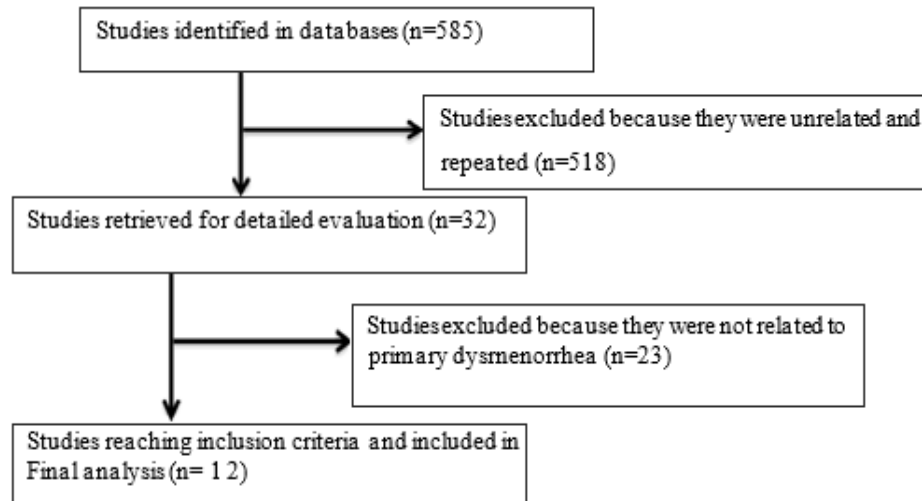


Figure 1: The selection process of included papers

FINDINGS

In the primary search, 588 articles were found. After reviewing the headings and abstracts of the papers and removing multiple copies and non-related ones, 32 possible

relevant papers were evaluated. Of these, 23 papers were excluded according to their abstract, because of the insufficient information and unavailability of original article. At last, 12 articles were selected for precise evaluation (Figure 1)

Table 1: A summary of papers evaluated for non-pharmacological treatments of primary dysmenorrhea

Authors	Types of study and n	Objectives	Results	Conclusion
Yu et al. (2010) ^[20]	Clinical, prospective and randomized. 60 patients.	To compare prompt effect of acupuncture of Sanyinjiao point (SP6) on blood flow of the uterine artery in PD to the Xuanzhong point (GB39).	There have been significant decrease in menstrual pain scores, pulse, resistance index and systolic and diastolic blood pressures in the SP6 treatment group five minutes after treatment. As compared to control group GB39, SP6 treatment group patients had significant decrease in changes in menstrual pain scores, pulse, resistance index and systolic and diastolic peak ratio five minutes after treatment. There have been no considerable changes in menstrual pain scores, pulse, resistance index and systolic and diastolic blood pressure before and after treatment in the GB39 control group (p>0.05).	This study concludes that acupuncture at SP6 may promptly improve uterine arterial blood flow in PD patients, while GB39 has no such effect
Yeh et al. (2013) ^[21]	Simple, blind, placebo controlled. 113 participants	To assess the influence of ear acupuncture on menstrual pain and distress of teenagers with dysmenorrhea.	Differences between groups were found in VAS and MDQ after interventions. Differences within group were found in changes of VAS, SF-MPQ and MDQ scores during interventions for both groups.	Ear acupuncture reduces teenagers' menstrual pain and distress and may be a guide for the use of ear acupuncture to treat dysmenorrhea. There has been pain decrease with placebo as well as with the real acupuncture point, but the latter was significantly better. Placebo acupuncture point cannot be used as control for ear acupuncture point and for qualitative assessing of dysmenorrhea.
Kannan et al (2014) ^[22]	Systematic review of randomized trials with meta-analysis. Women	The effect of physiotherapeutic	Considerable decrease in pain severity on a 0–10 scale was observed in each trial of heat, transcutaneous electrical nerve stimulation, and yoga. Meta-analysis of two trials of spinal manipulation showed no significant relief in pain. The studies didn't measure quality of life.	Physiotherapists could apply heat therapy, transcutaneous electrical nerve stimulation, and yoga for controlling the pain in primary dysmenorrhea. While benefits were also observed in acupuncture and acupressure groups, the absence of significant effects in sham-controlled groups indicates these methods also are beneficial
Jo et al (2018) ^[13]	A systematic review and meta-analysis. 11 databases	Assessing the evidence on heat therapy as a treatment for primary dysmenorrhea.	From six papers meeting inclusion criteria. Two RCTs showed acceptable effects of heat therapy on menstrual pain compared with unheated placebo therapy. Three RCTs showed acceptable effects of heating pads on menstrual pain compared with analgesic drugs. One RCT presented beneficial effects of heat therapy on menstrual pain compared with no treatment). However, these results are founded on relatively few trials with small sample sizes.	Review brings evidence of the positive effect of heat therapy for managing primary dysmenorrhea, but strict high-quality trials are still necessary to provide obvious evidence.
Gerzson et al (2014) ^[18]	Narrative literature review. 15 papers	Investigating, the benefits and accuracy of current therapies for primary dysmenorrhea, specifically in Physiotherapy	Studies were found explaining the beneficial use of thermotherapy, cryotherapy, transcutaneous electric nerve stimulation and connective tissue massage, Pilates and acupuncture on primary dysmenorrhea	It emphasize on the need for studies regarding physiotherapeutic maneuvers with further methodological strictness.

Bazarganipour et al. (2011) ^[23]	Double blind, randomized. 194 women	To assess whether the needling of Taichong point is effective to reduce dysmenorrhea pain.	The difference in dysmenorrhea intensity between groups was not significant in the first cycle, but was significant in the fourth cycle, and had decreased the pain considerably	The needling of acupoint Taichong is an effective and low cost way to decrease intensity of dysmenorrhea symptoms.
Bakhtshirin et al (2015) ^[24]	Clinical trial method. 80 eligible students	Investigating the effect of aromatherapy massage on the intensity of primary dysmenorrhea	A significant decrease in VAS score after lavender massage was detected in comparison with placebo massage. There was a statistically significant difference between VAS scores after and before placebo massage. In addition, statistically the effect of lavender massage on the severity of primary dysmenorrhea was higher than that of placebo massage.	Findings of this study showed that lavender oil massage lowers primary dysmenorrhea pain and can be used as an effective method of treatment.
Ouda et al (2017) ^[25]	Quasi experimental design. 78 female girls	Examine the effect of heat therapy on reducing pain of primary dysmenorrhea,	Heat therapy and stretching and core strengthening exercises are useful in reducing the severity of pain of dysmenorrhea in group A and B compared to group C (control group). Stretching and core strengthening exercises were more effective than heat therapy in relieving pain of dysmenorrhea.	Educating the young females about the importance of the application of heat and physical exercise for reducing menstruation pain is recommended
Potur et al (2014) ^[26]	Controlled, prospective study. 193 female students	Compares the effects of a low-dose heat patch for self-medication on the reduction of pain symptoms in dysmenorrhea	All groups had similar pain levels before the intervention and during the fourth and eighth hours after intervention, all groups experienced similar pain reduction in two consecutive cycles.	The authors observed that the heat patch is an effective way for decreasing dysmenorrhea pain.
Azima et al (2015) ^[27]	Controlled clinical trial. 102 students	Comparing the effects of reflexology and massage therapy on pain severity, pain duration, and anxiety level related to primary dysmenorrhea.	The results indicate a significant difference among the three groups regarding pain severity in the second and third cycles and pain reduction was more considerable in the massage group. Also, a significant difference was shown among the three groups concerning the mean of pain duration in the second and third cycles. However, the three groups were not significantly different with respect to the mean anxiety levels. Yet, within-group comparisons revealed a significant reduction in anxiety level in the massage group.	According to the study findings, it seems that both reflexology and massage therapy were effective in the reduction of pain and some other symptoms of dysmenorrhea.
Bai et al (2017) ^[12]	A randomized, sham-controlled trial. 134 participants	Evaluating the effect and safety of transcutaneous electrical nerve stimulation (TENS) therapy for reducing pain in women with primary dysmenorrhea (PD).	A total of 122 participants completed the study. Compared to sham TENS, active TENS showed a greater effect in pain reduction, with regard to the NRS, duration of relief from pain, and number of ibuprofen tablets taken ($P < .01$). However, no significant differences in the quality of life, measured by the WHOQOL-BREF score, were observed between two groups.	TENS was beneficial and safe in reducing the pain of participants with primary dysmenorrhea.
Parsa et al (2013) ^[28]	A randomized controlled study. 64 female.	Examining the effect of high-frequency Transcutaneous Electrical Nerve Stimulation (TENS) on primary dysmenorrhea and to compare it with placebo in a randomized controlled study.	The decrease in pain severity after TENS and placebo TENS were both significant. However, pain intensity in active TENS was significantly lower than the placebo group. Use of analgesic was decreased significantly in the active TENS; but not after placebo TENS.	This result indicates that using TENS could be useful in pain reduction of adolescents with primary dysmenorrhea

Another therapeutic option that can affect dysmenorrhea is hypnotherapy. Historically, hypnosis has gained popular acceptance as a pain controller. Hypnosis is a transient mode that changes one's accuracy, including phenomena like altering in consciousness and memory, increased sensitivity, inclusiveness, and the advent of responses and ideas that are not normal in the individual [29]. The positive effect of topical heat therapy on reducing the severity of dysmenorrhea is similar to that of ibuprofen [30]. Abdominal massage with aromatherapy with essential oils such as ginger, cinnamon, geranium, mandarin, and sage, diluted with almond oil, will reduce the severity of dysmenorrhea compared with acetaminophen [31]. Also, the positive effect of massage with the use of aromatherapy with lavender has been observed to reduce the intensity of pain in primary dysmenorrhea [24].

According to researchers, acupuncture stimulates receptors or nerve fibers, impulses of the pain are blocked by interactions with intermediates such as serotonin and endorphins, which reduces the severity of dysmenorrhea [32]. Blocking the nerves and injecting anesthetic into sensitive areas may reduce and relieve pain for a long time. Acupuncture has been one of the successful therapies in dysmenorrhea [33]. The methods of chiropractic (manual therapy of the spine) have been devoted to the treatment of menstrual pain, their treatment for traditional spinal cord (chiropractic). The results of four clinical interventional studies have shown that the effect of this technique on the intervention group and the control group is the same statistically, though it is better than no treatment at all [34]. Acupuncture is known to heighten levels of endorphins, serotonin, and acetylcholine in the central nervous system [35]. Systematic reviews have recommended that different acupuncture methods may be more beneficial than placebo, herbal therapies, and NSAIDs for treating pain caused by primary dysmenorrhea [36]. In the study of the effect of Trans cutaneous electrical nerve stimulation (TENS) in the treatment of primary dysmenorrhea in students showed that the use of tense in the case group alone was a good to excellent pain relief in 65 and the percentage of samples in comparison to 24% of the control group provided a significant reduction in the severity of symptoms of dysmenorrhea compared with the control group and it was concluded that there is a healthy, effective and non-nursing treatment for the treatment of primary dysmenorrhea [37]. Aerobic exercise after 8 weeks also has resulted in significant reduction of menstruation pain [38]. Considering the role of the trauma caused by the previous undesirable experience of menstruation and the positive relationship between anxiety and depression in dysmenorrhea, the effect of cognitive therapy as one of the methods of psychotherapy for the control of anxiety and depression can be considered as a non-pharmacological method for management of dysmenorrhea symptoms [16].

DISCUSSION AND CONCLUSION

The aim at this study is determining of concepts and definition of non-pharmacological treatment of primary dysmenorrhea according to previous studies. In this study, a

systematic review of all papers containing determination of most important non-pharmacological treatment methods of primary Dysmenorrhea including acupuncture, heat therapy, psychotherapy, massage therapy, hypnotherapy, physiotherapy, trans cutaneous electrical nerve stimulation (TENS) from 2010 till April 2019 was performed. The method of extraction of data in this review, including the designation of the problem under study, data gathering, analysis and interpretation of detections founded on the systematic study reporting system i.e. PRISMA. The search protocol of the articles was according the above methods. Because the vibration is coherent with the heat, it can be combined with commonly used primary dysmenorrhea treatments or alternate ones. Massage therapy reduces the severity of primary dysmenorrhea. Since pain relief without medication is an important health care target and can reduce the complications associated with medication, given the high prevalence of dysmenorrhea and the greater willingness of people to use non-pharmacological and also safe and inexpensive ways, It is recommended that non-pharmacological methods such as acupuncture, heat therapy, psychotherapy, massage therapy, hypnotherapy, physiotherapy, trans cutaneous electrical nerve stimulation (TENS) are used to reduce the primary dysmenorrhea intensity.

ACKNOWLEDGEMENTS

This article has been extracted from PhD thesis. It is approved and funded by deputy research of Tabriz University of Medical Sciences.

Conflicts of interest

The authors declare that there are no conflicts of interest.

Ethical Issues

This study was approved by the Ethics Committee of Tabriz University of Medical Sciences under the ethical code of IR.TBZMED.REC.1397.105.

REFERENCES

1. Song JA, Lee MK, Min E, Kim ME, Fike G, Hur MH. Effects of aromatherapy on dysmenorrhea: A systematic review and meta-analysis. *International journal of nursing studies*. 2018 Aug 1;84:1-1.
2. Osayande AS, Mehulic S (2014). Diagnosis and initial management of dysmenorrhea. *Am Fam Physician*. 2014 Mar 1;89(5):341-6.
3. Vincenzo De Sanctis M, Soliman A, Bernasconi S, Bianchin L, Bona G, Bozzola M, Buzi F, De C, Sanctis MD, Tonini G, Rigon10 F. Primary dysmenorrhea in adolescents: prevalence, impact and recent knowledge. *Pediatric Endocrinology Reviews (PER)*. 2015 Dec;13(2).
4. Esparham A, Herbert A, Pierzchalski E, Tran C, Dilts J, Boorigie M, Wingert T, Connelly M, Bickel J. Pediatric headache clinic model: implementation of integrative therapies in practice. *Children*. 2018 Jun;5(6):74.
5. Marjoribanks J, Proctor M, Farquhar C, Sangkomkham US, Derks RS. Nonsteroidal anti-inflammatory drugs for primary dysmenorrhoea. *Cochrane database of systematic reviews*. 2003(4).
6. Wong CL, Farquhar C, Roberts H, Proctor M. Oral contraceptive pill as treatment for primary dysmenorrhoea. *Cochrane database of systematic reviews*. 2009(2).
7. Mirabi P, Alamolhoda SH, Esmailzadeh S, Mojab F. Effect of medicinal herbs on primary dysmenorrhoea-a systematic review. *Iranian journal of pharmaceutical research: IJPR*. 2014;13(3):757.

8. Zhang F, Sun M, Han S, Shen X, Luo Y, Zhong D, Zhou X, Liang F, Jin R. Acupuncture for primary dysmenorrhea: an overview of systematic reviews. Evidence-Based Complementary and Alternative Medicine. 2018 Jan 1;2018.
9. Igwea SE, Tabansi-Ochuogu CS, Abaraogu UO. TENS and heat therapy for pain relief and quality of life improvement in individuals with primary dysmenorrhea: a systematic review. Complementary therapies in clinical practice. 2016 Aug 1;24:86-91.
10. Shetty GB, Shetty B, Mooventhan A. Efficacy of acupuncture in the management of primary dysmenorrhea: a randomized controlled trial. Journal of acupuncture and meridian studies. 2018 Aug 1;11(4):153-8.
11. LeĀ AI. Incidence and Non-Pharmacological Management of Dysmenorrhea. Journal of Medical Biomedical and Applied Sciences. 2016 Aug 14;3.
12. Bai HY, Bai HY, Yang ZQ. Effect of transcutaneous electrical nerve stimulation therapy for the treatment of primary dysmenorrheal. Medicine. 2017 Sep;96(36).
13. Jo J, Lee SH. Heat therapy for primary dysmenorrhea: A systematic review and meta-analysis of its effects on pain relief and quality of life. Scientific reports. 2018 Nov 2;8(1):1-8.
14. Adiputri A, Darmiyanti NM, Candra IW. The Effectiveness of Lavender Oil Treatment Using Effleurage Massage Technique Towards Dysmenorrhea Intensity of Female Students at Midwifery Academy of Kartini Bali. International Journal of Research in Medical Sciences. 2018:1886-9.
15. Apay SE, Arslan S, Akpınar RB, Celebioglu A. Effect of aromatherapy massage on dysmenorrhea in Turkish students. Pain management nursing. 2012 Dec 1;13(4):236-40.
16. Farshbaf Manei Sefat F, Abolghasemi A, Barahmand U, Hajloo N. Comparing the effectiveness of cognitive behavioral therapy and hypnosis therapy pain self-efficacy and pain severity in girls with primary dysmenorrhea. Armaghane danesh. 2017 Apr 10;22(1):87-103.
17. Woo HL, Ji HR, Pak YK, Lee H, Heo SJ, Lee JM, Park KS. The efficacy and safety of acupuncture in women with primary dysmenorrhea: a systematic review and meta-analysis. Medicine. 2018 Jun;97(23).
18. Gerzson LR, Padilha JF, Braz MM, Gasparetto A. Physiotherapy in primary dysmenorrhea: literature review. Revista Dor. 2014 Dec;15(4):290-5.
19. Ortiz MI, Cortés-Márquez SK, Romero-Quezada LC, Murguía-Cánovas G, Jaramillo-Díaz AP. Effect of a physiotherapy program in women with primary dysmenorrhea. European Journal of Obstetrics & Gynecology and Reproductive Biology. 2015 Nov 1;194:24-9.
20. Yu YP, Ma LX, Ma YX, Ma YX, Liu YQ, Liu CZ, Xie JP, Gao SZ, Zhu J. Immediate effect of acupuncture at Sanyinjiao (SP6) and Xuanzhong (GB39) on uterine arterial blood flow in primary dysmenorrhea. The Journal of Alternative and Complementary Medicine. 2010 Oct 1;16(10):1073-8.
21. Yeh ML, Hung YL, Chen HH, Wang YJ. Auricular acupressure for pain relief in adolescents with dysmenorrhea: a placebo-controlled study. The Journal of Alternative and Complementary Medicine. 2013 Apr 1;19(4):313-8.
22. Kannan P, Claydon LS. Some physiotherapy treatments may relieve menstrual pain in women with primary dysmenorrhea: a systematic review. Journal of physiotherapy. 2014 Mar 1;60(1):13-21.
23. Bazarganipour F, Lamyjian M, Heshmat R, Abadi MA, Taghavi A. A randomized clinical trial of the efficacy of applying a simple acupressure protocol to the Taichong point in relieving dysmenorrhea. International Journal of Gynecology & Obstetrics. 2010 Nov 1;111(2):105-9.
24. Bakhtshirin F, Abedi S, YusefiZoj P, Razmjooee D. The effect of aromatherapy massage with lavender oil on severity of primary dysmenorrhea in Arsanjan students. Iranian journal of nursing and midwifery research. 2015 Jan;20(1):156.
25. Khalil Ouda, Sameh Latif and Tayea Nabil A study of the effect of heat application on relieving dysmenorrheal pain among young females . African Journal of Nursing and Midwifery. 2017 June; 5 (6): 727-735.
26. Potur DC, Kömürçü N. The effects of local low-dose heat application on dysmenorrhea. Journal of pediatric and adolescent gynecology. 2014 Aug 1;27(4):216-21.
27. Azima S, Bakhshayesh HR, Mousavi S, Ashrafizaveh A. Comparison of the effects of reflexology and massage therapy on primary dysmenorrheal.2015.
28. Parsa P, Bashirian S. Effect of transcutaneous electrical nerve stimulation (TENS) on primary dysmenorrhea in adolescent girls. Journal of Postgraduate Medical Institute (Peshawar-Pakistan). 2013 Jun 21;27(3).
29. Shah M, Monga A, Patel S, Shah M, Bakshi H. The effect of hypnosis on dysmenorrhea. International Journal of Clinical and Experimental Hypnosis. 2014 Apr 3;62(2):164-78.
30. Rigi SN, Navidian A, Safabakhsh L, Safarzadeh A, Khazaian S, Shafie S, Salehian T. Comparing the analgesic effect of heat patch containing iron chip and ibuprofen for primary dysmenorrhea: a randomized controlled trial. BMC women's health. 2012 Dec 1;12(1):25.
31. Akin M, Price W, Rodriguez JG, Erasala G, Hurley G, Smith RP. Continuous, low-level, topical heat wrap therapy as compared to acetaminophen for primary dysmenorrhea. The Journal of reproductive medicine. 2014 Mar 1;26(2).
32. Liu T, Yu JN, Cao BY, Peng YY, Chen YP, Zhang L. Acupuncture for Primary Dysmenorrhea: A Meta-analysis of Randomized Controlled Trials. Alternative Therapies in Health & Medicine. 2020 Mar 1;26(2).
33. Zhang Q, Yue J, Golianu B, Sun Z, Lu Y. Updated systematic review and meta-analysis of acupuncture for chronic knee pain. Acupuncture in Medicine. 2017 Dec;35(6):392-403.
34. Huang ET, Di PhD YM. Acupuncture therapies for chronic obstructive pulmonary disease: a systematic review of randomized, controlled trials. Alternative therapies in health and medicine. 2014 Nov 1;20(6):10.
35. Chung YC, Chen HH, Yeh ML. Acupoint stimulation intervention for people with primary dysmenorrhea: systematic review and meta-analysis of randomized trials. Complementary therapies in medicine. 2012 Oct 1;20(5):353-63.
36. Cho SH, Hwang EW. Acupuncture for primary dysmenorrhoea: a systematic review. BJOG: An International Journal of Obstetrics & Gynaecology. 2010 Apr;117(5):509-21.
37. gerzB, Hong SH, Kim K, Kang WC, No JH, Lee JR, Jee BC, Yang EJ, Cha EJ, Kim YB. Efficacy of the device combining high-frequency transcutaneous electrical nerve stimulation and thermotherapy for relieving primary dysmenorrhea: a randomized, single-blind, placebo-controlled trial. European Journal of Obstetrics & Gynecology and Reproductive Biology. 2015 Nov 1;194:58-63.
38. Dehnavi ZM, Jafarnejad F, Kamali Z. The Effect of aerobic exercise on primary dysmenorrhea: A clinical trial study. Journal of education and health promotion. 2018;7.