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EFFECT OF JACOBSON'S RELAXATION TECHNIQUE VERSUS GENERAL STRETCHING EXERCISES AMONG COLLEGE GIRLS WITH PRIMARY DYSMENORRHEA

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ABSTRACT

Background-Primary dysmenorrhea is a common gynecological problem affecting college girls, causing significant menstrual pain and impacting daily life. This study aimed to compare the effectiveness of Jacobson's relaxation technique and general stretching exercises in reducing menstrual pain and improving quality of life among college girls with primary dysmenorrhea.

Aim of the study- To evaluate the effectiveness of Jacobson's Progressive Muscular Relaxation Technique versus General Stretching Exercises among college girls with primary dysmenorrhea.

Design- Comparative research design.

Setting- The study was conducted among college girls.

Sample- A convenient sample of 16 girls with primary dysmenorrhea.

Result- Both JPMR and General Stretching Exercises produced significant reductions in menstrual pain intensity and symptom severity. However, the JPMR group demonstrated a greater mean reduction in both VAS and MSQ scores compared to the stretching group. The findings indicate that relaxation-based therapy was more effective than stretching in alleviating menstrual pain and improving overall comfort during menstruation.

Conclusion- The study concluded that both JPMR and General Stretching Exercises are effective non-pharmacological approaches for managing primary dysmenorrhea. However, Jacobson's Progressive Muscular Relaxation was found to be more effective in reducing menstrual pain and associated symptoms among college girls. This technique can be recommended as a safe, simple, and cost-effective method for menstrual pain management and overall well-being.

Keyword's- Primary Dysmenorrhea, Jacobson's Progressive Muscular Relaxation, General Stretching Exercises, Visual Analogue Scale, Menstrual Symptoms Questionnaire, Physiotherapy Intervention

INTRODUCTION

Dysmenorrhea, most commonly known as menstrual pain, is a pervasive gynecological condition that significantly affect the health and well being of women during reproductive years. It is characterized by recurrent, cramping pain in the lower abdomen which occur just prior to or concurrently with menstrual bleeding. Despite being benign in most cases, its implication are far reaching, causing substantial disruption to personal, academic, occupational, and social functioning [1].

The prevalence of primary dysmenorrhea is remarkably high and variable, with global estimate ranging from 16% to 91%. This wide range is attributed to variations in study population, diagnostic definition, self reporting methodologies and cultural perception of pain. Nonetheless, the majority of epidemiological studies concur that more than half of menstruating women experience dysmenorrhea to some degree. Among them, an estimated 10% to 20% endure severe symptoms that impair normal daily activities and quality of life [2] [3].

Dysmenorrhea is generally classified into two distinct categories based on etiology:

Primary dysmenorrhea and secondary dysmenorrhea.

Primary dysmenorrhea is defined as menstrual pain in the absence of any identifiable pelvic pathology. It typically present in adolescence within a few years of menarche, coinciding with the establishment of regular ovulatory menstrual cycle. The pain often follows a predictable pattern, occurring with each menstrual cycle and usually peaking the first one to two days of menstruation.

In contrast, secondary dysmenorrhea is associated with identifiable gynecological conditions such as endometriosis, adenomyosis, uterine fibroids, pelvic inflammatory disease, or congenital anomalies of reproductive tract. It tends to manifest later in reproductive life and often present with atypical symptoms such as non-cyclical pelvic pain and uterine bleeding. Unlike primary dysmenorrhea, which is largely functional, secondary dysmenorrhea

necessitate target diagnostic evaluations and management of underlying pathology [4] [5].

The underlying pathophysiology of primary dysmenorrhea is predominantly driven by excessive production and release of prostaglandins, particularly prostaglandin F_{2α} and prostaglandin E₂. These potent bioactive lipids are synthesized from arachidonic acid via the cyclooxygenase (COX) enzymatic pathway. The process is initiated in the late luteal phase of menstrual cycle when progesterone level rapidly declines due to luteolysis especially in the absence of pregnancy. This hormonal withdrawal activates lysosomal enzymes such as phospholipase A₂, which catalyze the release of arachidonic acid from cell membrane phospholipids. Elevated level of prostaglandin results in enhanced myometrial contractility, increased intrauterine pressure, and vasoconstriction of uterine vessels. These changes lead to transient ischemia and hypoxia, stimulating nociceptive nerve endings in the uterine musculature and producing the characteristic pelvic pain. Researches have consistently shown that women with primary dysmenorrhea exhibited significantly higher level of PGF_{2α} and PGE₂ in both endometrial tissue and menstrual fluid compared to asymptomatic women, correlating directly with pain severity and symptom intensity [6] [7].

In addition to prostaglandins, other mediator such as vasopressin may contribute to symptom exacerbation by promoting further uterine contractions and reducing endometrial perfusion. These multifaceted mechanisms underscore the complex interplay between hormonal, vascular and neurochemical factors in the pathogenesis of dysmenorrhea [8].

Clinically primary dysmenorrhea manifests as sharp, spasmodic pain localized to the suprapubic region, frequently radiating to lower back and inner thighs. The pain typically begins several hours before the onset of menstruation and peaks within the first 24 to 36 hours. It is often accompanied by some systematic symptoms including nausea, vomiting, diarrhea, fatigue, headache, light headness and vasomotor symptoms such as cold sweat and pallor. In particularly severe cases women may experience syncope due to intense pain and vasovagal responses [9].

The socioeconomic and psychological burden of dysmenorrhea is substantial. It is leading cause of absenteeism from school and work among adolescents and young adults woman's. Recurrent episode of pain can significantly affect academic performance, occupational productivity and social participation. Dysmenorrhea has been linked to an increase incidence of mental health disturbance, including anxiety, depression and social

withdrawal. Moreover, many women with dysmenorrhea exhibit maladaptive cognitive pattern such as catastrophizing indicative of altered central pain processing and heightened pain sensitivity. This highlights the importance of both the physical and psychological dimension of the condition in clinical care [10] [11].

The management of primary dysmenorrhea involve both pharmacological and non-pharmacological intervention non-steroidal anti-inflammatory drugs (NSAIDs) are considered as first-line treatment due to their ability to inhibit Co-x enzymes and reduce prostaglandin synthesis. Hormonal contraceptives are also commonly used to suppress ovulation, stabilize endometrial growth, and reduce menstrual volume, indirectly decreasing prostaglandin production [12] [13]. Despite their effectiveness, some individual may experience inadequate symptom relief or adverse effects from these medications, prompting exploration into non-pharmacological interventions [14].

One such approach involves Jacobson's progressive muscular relaxation technique, a technique developed by Edmund Jacobson in 1920's. This technique involves systematic contraction and subsequent relaxation of targeted muscle groups, promoting a state of deep physical and mental relaxation [15]. The

theoretical foundation of this technique lies in the recognition that neuromuscular tension can alleviate psychological distress and pain perception [16]. Empirical evidence supports the effectiveness of this technique in decreasing muscle tone, oxygen consumption, heart rate, respiratory rate, while simultaneously enhance parasympathetic nervous system activity and endogenous opioid release. The resultant state of relaxation improve pain coping mechanism and reduce stress, anxiety and perceived discomfort. It is particularly advantageous due to its non-invasive, low-cost, and self-administered nature, required no specialized setting and equipment's. Its broad applicability and safety profile make it a viable adjunct therapy for dysmenorrhea [17] [18] [19].

Another such approach involves therapeutic stretching exercise, which have been shown to alleviate both the physical discomfort and psychological symptoms associated with dysmenorrhea [21]. Stretching particularly in the abdominal, pelvic and lower back region, is believed to reduce muscle tension, relieve nerve compression and improve uterine blood flow, thereby decreasing ischemic pain. This also improve muscle tone, joint flexibility, and postural stability offering both immediate and long-term benefits. Moreover, physical activity induces the release of endorphins (the body's

natural analgesics) and enhance systemic circulation and contributing to an overall well-being and pain reduction [22].

In conclusion, primary dysmenorrhea is a prevalent and multifactorial condition with significantly physiological, psychological and social implications. Although it is often unrecognized and its effects on adolescents and young women's is profound. A comprehensive approach to diagnosis and management which include both pharmacological and non-pharmacological strategies, is essential and effective for symptoms control. Among non-pharmacological method Jacobson's progressive relaxation and stretching exercises have demonstrated promising results in reducing pain and improving mental well-being, thereby representing valuable components of a holistic treatment approach. Early identification, patient centered care, and greater awareness are critical for mitigation the long-term consequences of this condition and improving the overall health outcomes of affected individual [23] [24].

REVIEW OF LITERATURE

1. **Hong Ju, et al. (2013)**, conducted a study on the prevalence and risk factors of. He performed a comprehensive review on longitudinal or cross-sectional or case control study on large community-based samples. 15 studies

met the inclusion criteria. Prevalence of dysmenorrhea varies between 16% to 91% in females of reproductive age with severe pain in 2% to 29% females studied. There are some other factors also such as family history and other modifiable factors such as cigarette smoking, diet, obesity etc. Finally, authors reviewed that dysmenorrhea improves with increased age, parity, and use of oral contraceptives and is positively associated with stress and family history of dysmenorrhea [25].

2. **Stella Iacovides, et al. (2015)**, a critical review is done on the awareness of primary dysmenorrhea. This review report is based on current knowledge, particularly with regards impact and consequences of recurrent menstrual pain and pain sensitivity, mood, quality of life and sleep in women with primary dysmenorrhea. Comprehensive literature searches performed on primary dysmenorrhea using different authentic sources. Published full-text manuscripts between 1994 to 2015 were reviewed. The results of this study said that women with primary dysmenorrhea have greater sensitivity to experimental pain both within and outside area of menstrual pain in

comparison with women with no dysmenorrhea. This pain sensitivity increases the chances of other chronic pain in later life. The authors concluded that there is need for further study to determine whether effectively blocking dysmenorrheic pain ameliorate risks of development of chronic pain disorder and to explore whether it possible to prevent the development – and not just treat- dysmenorrheic pain [26].

3. **Jerry R. Klein, et al.**, conducted a study on epidemiology of adolescent dysmenorrhea. In their study, they found that dysmenorrhea is one of the most common reason for repeated short-term absenteeism in the school among adolescent girls. There has been ongoing debate about the extent to which psychological and biological factors contribute to the development of dysmenorrhea. To explore this, data from 2699 adolescent girls aged 12-17 collected as a part of National Health Examination Survey were analyzed using both bivariate and multivariate method. Among these, 1611 girls (59.7%) reported experiencing menstrual pain, and approximately 14% of them frequently missed school due to menstrual cramp. The analyze revealed

that the most significant predictor of dysmenorrhea with gynecological age, or the number of year since menarche. Interestingly psychological factor such as preparation for menarche does not did not significantly influence the likelihood of experiencing dysmenorrhea or school absenteeism related to it. Overall, finding suggest that biological factors, particularly those related to reproductive maturity, play a more substantial role in the onset and impact on dysmenorrhea than psychological and demographic variables [27].

4. **Alaettin unsal, et al. (2010)**, conducted a study on prevalence of dysmenorrhea and its effect on quality of life among a group of female university students. They conducted a cross sectional study at Dumlupinar university, Kutahya, health high school, western turkey. They included 623 female students for study. For pain measurement 10-point VAS scale used along with S-36 questionnaire. For data analysis chi-square test, student's t- test, logistic regression, and ANOVA was used. Participants average age was 20.8 years ranging from 17 to 30 years. They found 72.7% prevalence among college

female students. In S36 questioner participant score was lowest. The authors concluded that prevalence of dysmenorrhea is high among college female students and has negative impact on their qol [28].

5. **Kural, et al. (2015)**, a cross-sectional study conducted on menstrual characteristics and prevalence of dysmenorrhea in college going girls. 310 participants included between the age ranging from 18-25years. For assessment a semi-structured questionnair were used and for pain assessment VAS were used. Among the total participant 84.2% reported experiencing dysmenorrhea while 15.8% did not report dysmenorrhea. And on the basis of VAS score, 34.2% experience severe pain, 36.6% moderate, and 29.2% had mild pain. Among the participants 90.9% girls experiencing dysmenorrheic pain had family history of dysmenorrhea. The authors concluded, that there is high prevalence among college students [29].
6. **Elia Fernandez-Martinez, et al.**, a cross-sectional study is conducted among Spanish female university to determine the prevalence of primary dysmenorrhea and also on lifestyle. 258 female university students recruited with mean age of 20.63 years. For data collection an anonymous self-report questionnaire was used. The result shown that the prevalence of dysmenorrhea was of 74.8% with a mean pain severity of 6.88. Also 38.3% student described severe menstrual pain and 58% as moderate and logistic regression analysis showed that lifestyle also affected by dysmenorrhea [30].
7. **Evans Paul Kwame Ameade, et al. (2018)**, a cross-sectional study conducted among university students in northern Ghana to analyze the impact and management strategies of primary dysmenorrhea. 293 female students randomly selected and a self-administered questionnaire is used. Result showed high prevalence rate i.e., 83.6% and dysmenorrhea also negatively affect daily life. To decrease pain level, they used some medication with some rest [31].
8. **Mie Kazama, et al.**, a cross-sectional study conducted in Japanese Female Junior High School student to determine the prevalence of dysmenorrhea and identifying associated factors. Total 1018

participants aged between 12-15 years. For pain assessment VAS was used. Result showed that the prevalence of moderate-severe dysmenorrhea was 476/1018(46.8%), for severe 180/1018(17.7%). And dysmenorrhea also affects daily activities [32].

9. **Nahal Habibi, et al. (2015)**, a cross-sectional study was conducted in Isfahan University of Medical Sciences, Iran to investigate the prevalence of primary dysmenorrhea and to determine its intensity associated factors. Total 311 female students participated between 18 to 27 years of age. Result showed 89.1% prevalence of dysmenorrhea. Factors that lead to high prevalence was family history, severe bleeding, lack of formal education [33].

10. **Romina-Marina Sims, et al., (2019-20)**, a study conducted at Romania in which five university center's included with the aim to assess the prevalence and management of dysmenorrhea and to determine its impact on medical students. For data collection original questionnaire was used. Total 1720 students included. Result showed that the prevalence of dysmenorrhea was 78.4%. During menstruation, 72.7%

feels nervous, 66.9% more tired, 75.9% feels lack of energy, 57.9% highly stressed, 30.0% feels lack of appetite and their social life was also affected. Authors concluded high prevalence of dysmenorrhea among medical students and their life is also affected in several aspects. For treatment purpose they use both pharmacological and non-pharmacological methods [34].

11. **Mike Armour, et al., (2018)**, a systemic review and meta-analysis study conducted to examine the prevalence of dysmenorrhea in young women and also its impact on their academic performance and other activities. It included 38 studies in which 21573 women eligible for meta-analysis. 23 studies from low, lower middle, or upper middle and 15 studies from high income countries. The study showed 71.1% prevalence irrespective of country economic status. 20.1% reported absence, 40.9% reported negatively affected in class performance as well as in concentration. The authors concluded there was high prevalence of dysmenorrhea and it also negatively impacted academic performance [35].

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- 12. Panel Demet Aktas (2014)**, a cross-sectional study conducted with 200 female students to investigate the prevalence and the factors affecting dysmenorrhea among University in Ankara. General questionnaire was used for data collection and VAS for pain measurement. Mean age of students 20.85 years. Result showed 84% prevalence of dysmenorrhea and mean pain severity 5.78 on VAS. Study found 45.8% experienced moderate pain, 34.6% irritability, 21.5% fatigue. For pain relief 69% use analgesics, 56.5% heat application, and 71.4% rest [36].
- 13. Panel Mario I. Ortiz (2010)**, a study conducted at Mexican University to evaluate the prevalence, impact and treatment of dysmenorrhea. Total 1539 students administered from six university medical programmes. Result showed that 64% prevalence of dysmenorrhea. 36.1% experienced mild, 43.8% moderate, and 20.1% experienced severe dysmenorrhea. 65% women with dysmenorrhea reported interruption in their daily activities, and 42% reported school absenteeism. For treatment, 25.9% consult a physician, and 61.7% use self medication which is painkiller. The author concluded high prevalence of dysmenorrhea among Mexican University students and it also impacted their daily activities [37].
- 14. N Shehata, et al., (2018)**, a cross-sectional study conducted among 1908 female student at Beni-Suef University, Egypt. The aim was to investigate the epidemiology of dysmenorrhea and also detect the knowledge source among female students. An Arabic language questionnaire was used. Result showed 92.9% prevalence of dysmenorrhea with associated symptoms. 65.7% experienced backache, 51% nervousness and irritation, 47.3% experienced acne and flushing. For treatment purpose 72.8% refer to their family members, 24.3% friends, 21.4% to teachers, 17.2% TV and internet, and only 6.9% refer to physician or nurses. The authors concluded high prevalence of dysmenorrhea among Beni-Suef University students [38].
- 15. Dilek Coskuner Potur, et al., (2013)**, a cross-sectional study was conducted among 1515 female students at a public university located in Istanbul (Turkey) to determine the prevalence, pain severity rating, effects on daily activities, school attendance, ability to
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communicate with friends, and methods to manage dysmenorrhea. Self-report questionnaire and VAS were used for data collection. Result showed 85.7% prevalence of dysmenorrhea. 30.4% reported severe pain, 49.8% moderate, and 19.8% mild. 6.33 was mean pain severity on VAS. For treatment majority of participants with severe pain preferred analgesics and also refer physician, whereas moderate pain participants prefer herbal tea, heat application, rest. The author concluded that dysmenorrhea is highly prevalent among university students and negatively impact female student social life by limiting their participation [39].

- 16. Amal Al Mulla, et al. (2022),** conducted a cross-sectional study among 456 adolescents in ten randomly selected private and government high schools in Dubai, United Arab Emirates to assess the prevalence of dysmenorrhea. Result showed 432(94.7%) have high prevalence of dysmenorrhea. Out of all, 208(45%) experience severe pain, 152(33.4%) were reported as absenteeism, 43.1% experience micturition with menstrual pain, and 46.7% experience defecation. For pain relief 147(32.3%) prefer

NSAIDs. The authors concluded that there is a need for better support and early detection so that specific measures can be taken to improve the quality of life of females and also increase their participation [40].

- 17. Jerry R. Klein, et al.,** conducted research to study epidemiology of adolescent dysmenorrhea. They collected data from 2699 menorrhoeal adolescents, which is drawn from the National Health Examination Survey. After the whole study they concluded that black students (23.6%) are most absent in school in comparison to white students (12.3%) with socioeconomic status. Data of whole study concluded that biological variable play most important role in pathogenesis of dysmenorrhea [41].

- 18. Evans Paul Kwame Ameade, et al.,** a cross-sectional study conducted among 293 females at Tamale campus of the university for developmental studies to assess the prevalence and impact of dysmenorrhea. Result showed total 83.6% prevalence rate of dysmenorrhea and in which 61.2% are having negative affect on their daily activities. For the purpose of treatment most common

preference was bed rest and use of paracetamol preparation [42].

19. **Mie Kazama, et al.**, conducted a cross-sectional study at Japanese female junior high school students to determine the prevalence of dysmenorrhea. Among total 1167 participants only 1018 completed the questionnaire. Result showed 46.8% moderate-severe prevalence of dysmenorrhea whereas 17.7% showed severe prevalence of dysmenorrhea. Results also showed moderate-severe dysmenorrhea associated with short sleeping hours and sports activities associated with severe dysmenorrhea. Authors concluded that dysmenorrhea adversely affect daily activities due to lack of awareness among girls [43].

20. **Hanan Ibrahim, et al. (2022)**, conducted a quasi-experimental, comparative study among nursing students with primary dysmenorrhea to investigate the effects of Jacobson's relaxation technique versus warm compress on pain intensity, fatigue and quality of life at Damanhour University in El-Beheira Governorate, Egypt. Data collected with the help of interview and by using basic tools such as VAS, FSS, and SF-36 scale. Result was shown that

Jacobson's relaxation technique is more effective as compared to warm compresses in pain reduction. The authors concluded that Jacobson's technique is more effective than warm compresses in relieving pain of primary dysmenorrhea [44].

21. **Shreya Sharma, et al.**, conducted a comprehensive review on the effectiveness of Jacobson's relaxation technique in relieving menstrual cramps or pain. This nonpharmacological intervention has been found very effective in relieving menstrual cramps or pain with their associated symptoms. This paper also shown that by regular practice of this technique it also improves the quality of life [45].

22. **Elsayed Hamdy Nasr Abdelhalim, et al.**, conducted quasi-experimental research in two governmental secondary schools in Port Said City to assess the effect of progressive muscle relaxation technique on pain intensity and fatigue associated with primary dysmenorrhea. Total 150 female adolescents were included for the study purpose. Data was collected by using different self-administered questionnaire. Result showed that there was statistically significant difference

between study and control group. Authors concluded that adolescent females with primary dysmenorrhea reported less pain and fatigue after using the progressive muscle relaxation technique [46].

23. Susan Annie George, et al., a study conducted among 30 adolescent girls from MTIMS, Ernakulum to evaluate the effect of physical activity and relaxation techniques in reducing pain intensity and menstruation related depression. Selected students divided into two groups: experimental group and control group. Both groups received intervention for 3 times per week for 4 weeks and their outcome measures are assessed by using VAS for pain and Beck Depression Inventory Scale for depression. Result showed that there is significant reduction in pain and depression in both the groups. Author concluded that both physical activity and relaxation technique work effectively on pain reduction and depression [47].

24. Jose, et al., conducted a systemic review to find the impact of relaxation technique on pre menstrual symptoms. They used Joanna Briggs Institute checklist to analyze the quality of

articles selected for this review. They used five major databases as their search engines. They concluded that among 71 relevant articles only 35 different studies focused on the concerned topic. According to authors review relaxation techniques were very effective in decreasing pre menstrual symptoms as well as provide physical and mental relaxation also at the same time [48].

25. Asli Sis Celik, et al., conducted a randomized prospective controlled study to assess the effect of progressive relaxation exercises on primary dysmenorrhea in Turkish student. They divided participants into two groups control group with 60 students and experimental group with 64 students. For data collection they used VAS and a dysmenorrhea monitoring form (DMF) were used for data collection. Results showed that there was significant reduction in VAS score post-exercise. Authors concluded that Progressive relaxation exercises are effective method for reducing dysmenorrhea when performed regularly [49].

26. Mario I. Ortiz, et al., conducted a cross-sectional study to assess the

effect of a physiotherapy program in women with primary dysmenorrhea among women of Universidad Politecnica de Pachuca, Hidalgo, Mexico. In this study female age of 18-22 years with primary dysmenorrhea; pain intensity from 4-10 on VAS; and sedentary lifestyle were included. Result showed that after the physiotherapy intervention there was significant reduction of pain in the treatment group as compared to the control group. The authors concluded that physiotherapy intervention including strengthening, stretching and muscle relaxation techniques, jogging, are effective for reducing dysmenorrheic symptoms [50].

27. Paloma Carroquino-Garcia, et al., performed a systemic review to study the efficacy of therapeutic exercise in the treatment of primary dysmenorrhea. Researches conducted between February 2017 and May 2017 from different sources were reviewed. In this review a specific age criterion between 16 to 25 years old women with primary dysmenorrhea included. Women having other health conditions were excluded. Among 455 studies; 16 were included in systemic review, and 11 were

included in the 3 meta-analyses. Authors concluded that therapeutic exercises are very effective in pain reduction in woman's with primary dysmenorrhea [51].

28. Jingjie Cai, et al., a systemic review and meta-analysis of randomized controlled trials performed to assess the effects of aerobic exercise to alleviate primary dysmenorrhea in adolescents and young women. Results showed that out of all the literature review 16 eligible studies, with 15 involving adolescent, and total 918 participants aged 15 to 43 years, the aerobic exercise can alleviate pain. The author concluded that the aerobic exercise was able to alleviate pain intensity and pain duration in adolescents and young women with primary dysmenorrhea [52].

29. Zeltia Naia, et al., conducted a cross-sectional observational study to identify the level of physical activity (PA) and menstrual pain intensity among women with PD, as well as relationship between these variables. For data collection a self-administered questionnaire was used. Result revealed that 38% women did not perform any intense PA during last 7 days, and 32.4%

did not performed any moderate PA. There was no significant difference were found among womens. The authors concluded that menstrual pain intensity does not differ between the type of PA [53].

30. Chen Tsai, et al., a randomized controlled trial study was performed to compare the effectiveness of different exercises for reducing pain intensity in primary dysmenorrhea. The primary difference outcome was the effect of exercise on pain intensity measured by VAS at 4 and 8 weeks after intervention. The secondary outcome was the difference in risk of dropout at 8 weeks. Results showed that all exercise interventions were effective in reducing menstrual pain at 8 weeks. The authors concluded that all interventions were effective in reducing menstrual pain in primary dysmenorrhea after 8 weeks of interventions. Among all the exercise regime relaxation exercise was found to be the most effective in reducing menstrual pain in primary dysmenorrhea [54].

31. Mike Armour, et al., conducted a comparative study exercise versus no treatment, results revealed that exercises may have a large effect on

reducing menstrual pain intensity as compared to no exercise. Exercises reduces overall menstrual symptoms such as back pain or fatigue compared to no treatment, or improves mental quality of life. The other comparison was Exercise versus NSAIDs, result of this comparison was uncertain [55].

32. Shahnaz Shahr-Jerdy, et al., conducted a study to assess the effect of stretching exercises on primary dysmenorrhea in high school adolescent girls. Total 179 girls were selected aged between 15-17 years. The participants were randomly divided into two groups: intervention and control group. In intervention group subjects are asked to perform stretching exercises for 8 weeks. Result showed that after 8 weeks, pain intensity was reduced, pain duration was decreased. The authors concluded that stretching exercises are effective in reducing pain intensity, pain duration, and the amount of painkillers used by girls with primary dysmenorrhea [56].

33. Hand S Saleh, et al., conducted a randomized controlled study to assess stretching or core strengthening exercises for managing primary dysmenorrhea. They randomly

assigned to two exercises and one control groups using a computer-generated randomization list. The interference groups were asked to perform either active stretching or core strengthening practice for 8 weeks. The result showed that the intensity and duration of pain were significantly reduced in exercise groups. The authors concluded that active stretching or core strengthening exercises seem to be an easy, non-pharmacological method for managing primary dysmenorrhea [57].

34. Farideh Vaziri, et al., conducted a randomized clinical trial to compare the effects of Aerobic and Stretching exercises on the intensity of primary dysmenorrhea in the students of universities of Bushehr. Total 105 female students were selected for the study and divided into aerobic exercise, stretching exercise, and control groups. Two intervention groups performed exercise for 8 weeks. Results showed that there was a significant reduction in pain intensity after the intervention. The author's concluded that both the exercises were effective in reducing the severity of dysmenorrhea [58].

35. Sri Rejeki, et al., conducted quasi-experimental research to find out the

effect of abdominal stretching on the pain intensity of menstrual cramps. Total 130 female adolescents were included in the study, and divided into two groups that is intervention group and control group. Results findings showed a significant reduction in pain intensity. The authors concluded that abdominal stretching exercise is significantly effective in reduction of pain intensity [59].

36. Kristina Gamit, et al., conducted a study at SBB College of physiotherapy to assess the effect of stretching exercise on primary dysmenorrhea in adult girls. Total 30 participants were included in the study which are divided into two groups that is intervention group and control group. Result showed significant improvement in pain. The authors concluded that stretching exercises are effective in reducing pain among females [60].

37. Narges Motahari-Tabari, et al., conducted a randomized clinical trial study to compare the effect of stretching exercises and mefenamic acid on reduction of pain and menstruation characteristics in primary dysmenorrhea. Total 122 female students with moderate to severe

dysmenorrhea were included in the study. The exercise program was prescribed to one group for three times a week whereas other group received 250mg capsule of mefenamic acid every eight hours after the onset of menstruation until pain relief. Results showed that there was no significant difference in the severity and duration of pain between the two groups. The authors concluded that stretching exercises were as effective as mefenamic acid and also the effects of exercises on relieving menstruation pain increases over time [61].

38. Eka Suryaning Tyas, et al., conducted a quasi-experimental study to assess the effect of abdominal stretching, yoga, and dysmenorrhea exercises on prostaglandin levels and pain. Total 32 female students were involved and all students are divided into four groups in which three groups receiving abdominal stretching, yoga therapy, and dysmenorrhea exercises, respectively, and remaining one group serving as control group. Result showed that the difference in prostaglandin levels was highest in the dysmenorrhea exercise group and lowest in the control group. Pain level

also decreases among participants. The authors concluded that there were significant effects of exercise is seen on the reduction of prostaglandin levels and dysmenorrheic pain [62].

39. Neha S Patel, et al., conducted a study to assess the effect of active stretching exercises on primary dysmenorrhea in college going female's students at Shree B.G Patel College of physiotherapy, Anand and Shree Jalaramgirls hostel, V.V Nagar. Total 120 girls were selected for the study and were divided into two groups that is experimental group and control group. Intervention group subjects were asked to perform six active stretching exercises for eight weeks. Result showed that after 8 weeks of intervention there was significant reduction in the pain intensity. The authors concluded that active stretching exercises decrease pain and other sign and symptoms related to dysmenorrhea.[63]

40. Naglaa Fathy Ahmed, et al., conducted a quasi-experimental (pre and posttest) study on the faculty of nursing to assess the effects of stretching exercises on improving pain and daily activities of girls with primary

dysmenorrhea at Minia University. Total 120 girls are included which are divided into two groups that is study and control group. Results showed that there was significant reduction in the pain intensity. The authors concluded that after the implementation of stretching exercises there was a significant level of improvement is seen among students [64].

41. Pooja Soni, et al. conducted a study to assess effectiveness of pilates and self-stretching exercise on pain and quality of life in primary dysmenorrhea. Total 38 females were included in the study which are divided into two groups. Group-A was treated with pilates and Group-B was treated with self-stretching. Both the interventions were recommended for 4 weeks. Results showed that there was significant reduction in pain and their quality of life is also improved. The authors concluded that both the interventions are very effective but pilates are more impactful in reliving pain as compared to stretching [65].

42. Akram Ahmadi Barati, et al., conducted a research study to compare the effect of stretching exercises and combination of massage-stretching

exercises on primary dysmenorrhea of female students of Razi University of Kermanshah. Total 90 students were selected for the study and they were randomly divided into three groups. Each group is asked to perform exercise regime for 3 weeks. Results revealed that there were significant difference between the three methods of exercises in terms of pain severity, duration and nature of pain. The authors concluded that all the three interventions are very effective in reduction of pain [66].

43. Ronika Agrawal, et al., conducted a comparative study of stretching exercises versus core strengthening exercises on primary dysmenorrhea in young sedentary females. Total 60 female students were selected and divided into two groups. One group was given stretching exercises while other was given core strengthening exercises. Result revealed that there was significant reduction in pain score. The authors concluded that both the interventions are very effective in reducing pain intensity among girls suffering from primary dysmenorrhea [67].

44. Zizi Ibrahim, et al., conducted a randomized controlled study to assess the efficacy of active stretching

exercises against symptoms of primary dysmenorrhea in young adult females. Total thirty-three females with primary dysmenorrhea were selected and which are randomly divided into three groups. Result showed that there was a significant reduction in pain intensity. The authors concluded that stretching exercises can be used as a non-pharmacological intervention for pain reduction in primary dysmenorrhea [68].

RESEARCH METHODOLOGY

AIM OF THE STUDY

To evaluate the effectiveness of Jacobson's Progressive Muscular Relaxation Technique versus General Stretching Exercises among college girls with primary dysmenorrhea.

OBJECTIVES

1. To assess the pre intervention level of pain intensity among college girls with primary dysmenorrhea.
2. To implement Jacobson's Progressive Muscular Relaxation Technique among participants in Group A and evaluate its effect on primary dysmenorrhea.
3. To implement General Stretching exercises among participants in Group B and evaluate its effect on primary dysmenorrhea.

4. To compare post intervention pain intensity level between the two groups.
5. To determine which intervention is more effective in reducing the symptoms of primary dysmenorrhea.

STUDY SETTING

Present study is conducted in Department of Physiotherapy. Based on the premenstrual symptom screening (N=16) subjects are selected, (n=8) for each intervention group i.e., group A and group B. The students are not performing any kind of physical activity.

STUDY DURATION

The duration of the study was total 4 weeks and both the interventions were performed 3 times every week on alternate days with approx. 45min. of each session.

VARIABLES

Independent variable:

The intervention provided

Group A: Jacobson's progressive muscle relaxation

Group B: General stretching exercises

Dependent variable:

Level of primary dysmenorrhea symptoms, measured by:

Pain intensity- VAS

Menstrual symptoms severity- Menstrual symptom questionnaire.

SAMPLING METHOD

Sample size

In the present research study, the sample consists of 16 girls with primary dysmenorrhea were allotted into two groups namely Group A (Jacobson's progressive muscle relaxation technique) and Group B (General stretching).

Sampling technique

Convenient sampling used to select participants.

INCLUSION CRITERIA

- College girls aged 18-25
- Experiencing primary dysmenorrhea
- Not using any relaxation technique or stretching for menstrual pain management.

EXCLUSION CRITERIA

- Girls with secondary dysmenorrhea
- Those using currently any relaxation techniques or stretching exercises
- Girls with severe medical conditions that may affect the outcome of the study.

HYPOTHESES

1. H0: There will be no significant reduction in the intensity of dysmenorrhea among college girls after practicing Jacobson's Relaxation Technique.
2. H1: There will be a significant reduction in the intensity of dysmenorrhea among college girls after performing general stretching exercises.

PROCEDURE

In this study total 16 girls were selected which are further divided into two groups for intervention purpose i.e. group A (Jacobson's Progressive Muscular Relaxation Technique) and group B (General stretching exercises). For the measurement of pain intensity VAS is used whereas for menstrual symptoms MSQ is used. Both the tools i.e., VAS and MSQ were used before and after the intervention and that their difference were recorded for final results.

Group A- Jacobson's Progressive Muscle Relaxation

General instructions (Before and during muscle relaxation exercise):-

- a. To sit on a chair as comfortably as possible. Keep body loose.
- b. Be calm and comfortable.
- c. Keep eye closed.
- d. Avoid extra movement of the body.
- e. During the part of exercise cycle tense the muscle tightly and hold for slow count of 5 seconds.
- f. During the relaxation part of exercise cycle relaxes the muscle quickly and completely, let your mind relax and appreciate how relaxed the muscle is feeling for 10 seconds.
- g. Try to keep all other muscles group relaxed as you exercise specific muscle group.

- h. As you exercise from head to toe. Observe changes like tightness and the development of light and soothing sensations.
- i. Relax by taking three deep breaths inhaling through nose and exhaling through mouth after each step.

Intervention 1-For hands

Clench each fist (right and left), feel the tension in the fist and forearm respectively for 5 seconds.

Release the fist, relax and feel relaxation for 10 seconds.

2- For Arms

- a. Bend each arm (right and left) up at the elbow and tense the biceps, keeping the hand relaxed, feel the tension for 5 seconds. Release the arm, relax and feel relaxation for 10 seconds.
- b. Straighten the arm (right and left) and tense the triceps leaving the lower arms supported by the chair with the hands relaxed, feel tensing for 5 seconds. Relax and feel relaxation for 10 seconds.

3-For Facial muscle

- a. Wrinkle your forehead, try to make your eyebrows touch your hairline which produces tension, feel the tension for 5 second. Release the eye brows and relax for 10 seconds.

- b. Close your eyes and squeeze the muscle around the eyes for 5 seconds. Release and feel relaxation for 10 seconds.
- c. Tense the jaw by biting the teeth together, feel the tension in the jaw muscle for 5 seconds. Release and feel relaxation for 10 seconds.
- d. Press the tongue hard and flat against the roof of mouth with lips closed notice tension in throat and feel it for 5 seconds.
Release and feel relaxed for 10 seconds.

4-For Neck and Shoulder

- a. Push the head back as far as possible (against the hands), feel the tension for 5 seconds. Bring head to its position, relax and feel relaxation for 10 seconds.
- b. Bring the head down and press the chin down on the chest for 5 seconds. Bring back head to its position, relax and feel relaxation for 10 seconds.
- c. Tense shoulder by tightening and shrinking shoulders (shrug your shoulders up to your ears), feel the tension for 5 seconds. Release, relax and feel relaxation for 10 seconds.

5-For Chest

Take a deep breath, completely filling the lungs, hold the breadth for few seconds and passively exhale. Relax and feel relaxation for 10 seconds.

6-For stomach

Pull in the stomach and tense the stomach muscle for 5 seconds. Release the stomach and feel relaxation for 10 seconds.

7-For Back

Arch your back away from the chair and feel tension at your back for 5 seconds.

8-For thighs and buttocks

Tense both the thigh muscles and buttocks by squeezing muscles together and maintain it for 5 seconds. Release the muscle and feel relaxation for 10 seconds.

9-For Lower legs

Point toes towards your head, producing tension in calf muscles, feel this muscle tension for 5 seconds and after that feel relaxation for 10 seconds. Point the toes away from the head, feel this muscle tension for 5 seconds and after that feel relaxation for 10 seconds.

10-For toes

Pull toes towards body and hold for 5 seconds and after that feel relaxation for 10 seconds.

Post- exercise

Relax whole body completely.

Keep your eyes closed and let yourself remain in the relaxed position.

Open your eyes and enjoy reserved energy to feel relaxed and refreshed.

Sit up, stretch, and stand up slowly.

Group B- General stretching

Parameters of stretching exercises: - Type of stretch: active, basic static stretch

Duration: 30-45 minutes

Intensity: low to moderate intensity (more comfortable to the patient)

Sets: 1 set

Repetitions: 10 repetitions

Duration of stretch cycle: Hold for 10 seconds each time, 10 seconds' rest

The stretching exercises were performed with exhalation and participants were instructed not to do stretching with high intensity.

Therapeutic procedure

Exercises: -

1. Stretching iliopsoas by assuring the lunging position with the back leg extended.
2. Stretching rectus femoris by standing on one leg and holding the ankle of the opposite limb from behind.
3. Stretching hamstring by leaning trunk forward and touching toes.
4. Stretching lower back muscle by lying supine on lower back rotation stretch, bridge exercise, and knee to chest.
5. Stretching lower abdominal muscles by lying prone and then raising the chest with the hands supported on floor.

6. Stretching adductor muscles by sitting on the floor, bending knees, and letting soles of feet touch each other, pulling heels together, then leaning trunk forward to the hip.

DATA ANALYSIS AND INTERPRETATION

Data were systematically collected from 16 college girls who fulfilled the inclusion criteria and were divided into two groups.

Group A: Participants who received Jacobson's Progressive Muscular Relaxation technique.

Group B: Participants who performed General Stretching Exercises.

Before starting the intervention, baseline readings were taken for both groups to assess the initial pain intensity and menstrual symptom severity. The outcome measures used were:

1. Visual Analogue Scale (VAS): to assess the subjective intensity of menstrual pain.
2. Menstrual Symptoms Questionnaire (MSQ): to evaluate the variety and severity of symptoms experienced during menstruation,

including physical, behavioral, and emotional aspects.

The analysis aims to determine whether there was a statistically significant reduction in pain intensity and menstrual symptoms following the respective interventions. The data were analyzed using appropriate statistical methods. The pre- and post-test values of VAS and MSQ were compared to assess the effectiveness of the interventions.

Through this analysis, the study attempts to validate the research hypotheses:

1. Null Hypothesis (H_0): There is no significant difference between the effects of JPMR and General Stretching on menstrual pain and symptoms among college girls with primary dysmenorrhea.
2. Alternative Hypothesis (H_1): There is a significant difference between the effects of JPMR and General Stretching on menstrual pain and symptoms among college girls with primary dysmenorrhea.

Table 1: Descriptive Statistics

VARIABLE	MEAN ($\bar{x}$)	Std. DEVIATION (SD)	SKEWNESS	KURTOSIS
VAS Score (Pre-Test)	7.88	0.83	0.28	-1.39
MSQ Score (Pre-Test)	54.31	6.25	0.27	-1.02
Age	20.00	1.39	0.00	-0.70

Table 1 represents the obtained value of obtained value of descriptive statistics such as mean, standard deviation, skewness, and kurtosis and also specify that the obtained skewness and kurtosis value for all the baseline variables (VAS score, MSQ score, and age) fall

within the acceptable range. The skewness value for MSQ Score (Pre-Test) is 0.21 and its Kurtosis is -1.02. Since all values lie between (-2 and +2), this demonstrates that the obtained findings depict normal distribution.

Table 2: Independent Sample T - Test

VARIABLE	t-value	Sig. (2- tailed)
Change in VAS score	-6.859	.000
Change in MSQ score	-13.336	.000

Inferences from **Table 2** indicates that there is statistically significant difference in the reduction of pain intensity as well as in the reduction of menstrual symptoms between the Jacobson's group and the stretching group. The

results shows that general stretching (group 2) intervention is significantly less effective than the Jacobson's progressive relaxation technique (group 1) in reducing both pain intensity and menstrual symptoms.

Table 3: Paired Sample T-Test

GROUPS	Mean	t- value	Sig.(2-tailed)
Group 1 (JPMR)	3.3750	12.830	0.000
Group 2 (GS)	1.2500	7.638	0.000

According to the obtained findings from the above given **Table 3** it has been stated that the ($p > 0.05$) suggesting that there is statistically significant difference between both the groups and the JPMR (group-1) with high mean value

of (3.38) is more effective intervention in reducing pain intensity among college girls than GS (group-2) with low mean value of (1.25).

Table 4: One Way Ancova

VARIABLE	Mean Sq.	Sig.
VAS Pre010	3.848	.004
Group	18.063	.000

a. R squared = .845 (Adjusted R square = .821)

According to above **Table 4**, the ($p > 0.05$) suggesting that there is statistically significant difference between the two group. Therefore, it implies that intervention group 1 (Jacobson's muscular relaxation technique was more effective in reducing pain intensity among college girls than group-2 (general stretching).

DISCUSSION

The major goal of the present study is to ascertain the effect of Jacobson's progressive muscular relaxation technique versus general stretching exercise among college girls with

primary dysmenorrhea. The statistical analysis showed that the JPMR group had a higher mean reduction in pain intensity compared to GS group, indicating that JPMR was more effective in relieving pain. The paired sample t-test showed a significant difference within the groups suggesting that both interventions helped reduce menstrual symptoms. The independent sample t-test and ANCOVA results further suggested that JPMR was more effective than the GS group in reducing pain intensity and menstrual symptoms among

college girls with primary dysmenorrhea. The possible reasons for this improvement may be that the JPMR works by reducing muscle tension, anxiety and physiological stress which helps in relaxation of the uterine muscles and improve blood circulation, thereby decreasing pain perception. In contrast, general stretching exercises mainly improves flexibility and blood flow but does not provide the same relaxation response as JPMR. For primary dysmenorrhea, mechanism by which JPMR may reduce pain include – reduction of pelvic and abdominal muscle tension which could lessen cramping and pain, downregulation of physiological stress response which can increase pain perception when elevated and central modulation of pain perception via improved relaxation, better pain-coping leading to lower subjective pain ratings on VAS and fewer reported menstrual symptoms.

Both interventions had positive effects on menstrual symptoms, but the improvement was more profound in the JPMR group. Effects seen in the JPMR group included- Decrease in pelvic muscle tension and abdominal cramps, Reduced mood swings, irritability, and emotional instability, Lower levels of fatigue and tiredness, Improved internal calmness and mental clarity,

Reduction in autonomic stress responses (heart rate, anxiety, cortisol)

Likewise, Effects seen in the General Stretching group included- Reduced lower abdominal discomfort and backache, Mild reduction in fatigue due to improved blood circulation, Improved physical flexibility. However, little to no effect on emotional symptoms like anxiety or mood swings.

Thus, JPMR proved to be a more holistic technique, addressing both physical pain and psychological symptoms, whereas stretching mainly helped on a physical/muscular level.

CONCLUSION

Primary dysmenorrhea is one of the most common gynecological problems among adolescent and young adult females, often affecting their academic performance, daily activities, emotional wellbeing, and overall quality of life. The purpose of the present study was to compare the effectiveness of Jacobson's Progressive Muscular Relaxation (JPMR) technique and General Stretching Exercises (GS) in reducing menstrual pain and associated symptoms among college-going girls with primary dysmenorrhea. Based on the statistical findings, both interventions were effective; however, JPMR demonstrated significantly greater benefits in pain reduction, symptom relief, and enhancement of quality of life.

The present study concluded that both Jacobson's progressive muscular relaxation (JPMR) and General stretching exercises (GS)

were effective in reducing menstrual symptoms among college girls with primary dysmenorrhea. However, JPMR showed greater effectiveness than the general stretching as it produced higher reduction in pain intensity and menstrual symptoms. The results suggests that regular practice of JPMR helps in relaxing the muscles, reducing anxiety and improved blood circulation which collectively lead to a significant decrease in menstrual pain. JPMR works best for students with primary dysmenorrhea, particularly for those wishing to limit analgesic use. Being a simple, cost-effective and non-pharmacological intervention, JPMR can be easily incorporated into physiotherapy practices and woman rehabilitation programs to help manage menstrual pain and improve quality of life. Thus, the study validates the assumption that non-pharmacological interventions, especially. JPMR, are effective in reducing dysmenorrhea and can serve as safe alternatives to pain medications.

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MASTER TABLE

Patient ID	Group	Age (yrs)	VAS Pre	VAS Post	MSQ Pre	MSQ Post	Cycle Regu.	Pain Med.	VAS Change	MSQ Change
P01	A	20	8	5	55	30	1	0	-3	-25
P02	A	19	7	4	48	20	1	0	-3	-28
P03	A	21	9	5	62	35	1	0	-4	-27
P04	A	19	7	3	45	22	1	0	-4	-23
P05	A	20	8	6	53	35	0	0	-2	-18
P06	A	22	9	5	65	40	1	0	-4	-25
P07	A	18	7	4	49	25	0	0	-3	-24
P08	A	21	8	4	58	32	1	0	-4	-26
P09	B	20	9	7	60	50	1	1	-2	-10
P10	B	19	7	6	50	42	1	0	-1	-8
P11	B	21	8	7	55	48	0	1	-1	-7
P12	B	20	9	7	63	55	1	0	-2	-8
P13	B	18	7	6	47	38	0	0	-1	-9
P14	B	22	8	7	56	45	1	1	-1	-11
P15	B	19	7	6	49	40	1	0	-1	-9
P16	B	21	8	7	54	45	1	0	-1	-9