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Comparative effect of lower limb and abdominal isometric exercises and yoga poses on primary dysmenorrhea.

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Abstract

The aim of the study was to analyze comparative effect of lower limb and abdominal isometric exercises v/s yogasana on primary dysmenorrhea. Materials and Methods: Total 75 females were recruited out of which 60 subjects were selected based on inclusion criteria. The samples were divided into two groups: Group A (Isometric exercises) and Group B (Yogasana). The outcome measure used was Moos Menstrual Distress Questionnaire (MDQ), Score was taken for both groups pre-intervention and post-intervention at the end of 8th week of their intervention programme. Data was analyzed using Microsoft Excel. The results were expressed as proportions after the normalization of the data and p value (<0.05) was considered significant.

Results: The significant difference was noticed in intra group comparison in group A and group B in MDQ score (p<0.05). And difference in Group B was greater than Group A in inter group comparison (p<0.05).

Conclusion: Study concluded that both lower limb and abdominal isometric exercises and asanas help in reducing distress related to primary dysmenorrhea. However, Yoga intervention is more effective in treatment of primary dysmenorrhea than lower limb and abdominal isometric exercises.

Keywords: Primary Dysmenorrhea, Yogasana, Isometric exercise, Moos Menstrual Distress Questionnaire

Introduction

Dysmenorrhea is characterized by menstrual pain⁽¹⁾. It can be classified as Primary (absence of pelvic pathology) and Secondary (presence of pelvic pathology) dysmenorrhea.⁽²⁾ The prevalence of dysmenorrhea was found to be 79.67% in adolescent girls⁽³⁾. The risk factors are age <20 years, nulliparity, heavy menstrual flow, early menarche (<12years), longer cycles, smoking, upper socioeconomic status, physical inactivity, sterilization, sexual abuse, attempts to lose weight, disruption from social networks, depression and anxiety⁽⁴⁻⁷⁾. The etiology of primary dysmenorrhea is due to release of uterine prostaglandins, particularly PGF_{2α} as this stimulates myometrial contraction, ischemia and sensitization of nerve endings and thus causing pain^(6,8).

Exercises such as isometric and yogasanas have been proved to reduce pain as well as other distress related to dysmenorrhea^(1,8). Isometric exercises work

on muscle in static position and generates muscle tension without actual movement. Moreover, it is localized to area or joint⁽⁸⁾. Whereas, Yoga includes relaxation, control of breathing and various asanas. These asanas can be practiced in both isotonic and isometric way, adding to, it establishes generalized feeling of well being^(1,9). Therefore the purpose of this study is to find the most effective intervention of the two in preventing or reducing pain and distress related to menstruation.

Materials and Methods

- After approval from the institute from ethics committee, written informed consent from total 75 females were obtained. 60 subjects were selected based on inclusion and exclusion criteria. The samples were allocated into two groups: Group A (Isometric exercise) and Group B (Yogasana). Inclusion criteria for study was age 15-25 years, pain during menses intensity 5 or more on VAS (visual analogue scale), regular menstrual

cycle, nulliparous, knowing English language. Exclusion criteria being suffering from any systemic/reproductive or cardiovascular disease, recent orthopedic injuries which will restrain them from doing exercises, on oral contraceptive pills or any other fertility treatment. The study intervention was carried out for 8 weeks^(1, 8, 9). Duration of each session was 25 min.

- The outcome measure used was Moos Menstrual Distress Questionnaire (MDQ), it has reliability of 0.81 and validity (0.88)^(11, 12). MDQ has 8 components and subcomponents counting to total of 47 symptoms. MDQ score was taken for both groups pre- value and at 8th week of their intervention programme.

- Interventions

- Group A: (lower limb and abdominal isometric exercises)



Group A performed exercises after 5th day of their 1st menstrual cycle 5 days a week and 10 times per session for 8 weeks. All exercises were in supine position and

were continued during 2nd cycle menses days as well. In each stage patient had to hold position for 5 second and then relax^(5,8).

- Static hip adductor exercises.
- Static hip abductors exercise.
- Static back muscles.
- Static abdominals.
- Statics right oblique abdominals.
- Statics left oblique abdominals.

Group B (Yoga group):

Group B performed- Yogasana after 5th day of their menstrual and were continued during second cycle menses 5 days a week, for 8 weeks. The asanas were performed 5 times each and hold the position for 15 to 30 seconds as per individual's ability to hold it. The Yogasana that they practiced were as bellow.^(1,9,10):

<p>1.Bhujangasana</p>	
<p>2.Bidalasana</p>	

Cont...

<p>3.Setu Bandhasana</p>	
<p>4.Pawanmuktasana</p>	
<p>5 .Baddha konasana</p>	

Results

The data collected were analyzed using SPSS (17) and Microsoft excel. Level of significance was set as 95% thus (p <0.05) was considered significant. Normalization of data was done .The intra – group comparison was done using paired t- test and inter –group analysis was done using unpaired t-test.

TABLE 1 Between group comparisons of Age

Age	Group A	Group B	T value	P value
Mean (SD)	20.3 (±1.6)	20.7 (±2.5)	-0.18	0.42

The mean age for group A (Isometric exercise) was 20.63(±1.6) and 20.73 (±2.5) in Group B (yoga group). Unpaired t test was performed and p value was not significant (p = 0.42). This indicates that the data was comparable at base line (as shown in table 1).

Table 2- Intra group comparison of group A for pre and post 8 weeks MDQ questionnaire score.

	Mean difference	p value	INTERPRETATION OF p value
PAIN	4.13	P < 0.001	SIGNIFICANT
CONCENTARION	2.03	P < 0.001	SIGNIFICANT
BEHAVIOURAL CHANGES	2.43	P < 0.001	SIGNIFICANT
AUTONOMIC REACTIONS	0.56	P < 0.001	SIGNIFICANT
WATER RETENSION	1	P < 0.001	SIGNIFICANT
NEGATIVE EFFECTS	2.73	P < 0.001	SIGNIFICANT
AROUSAL	1	P < 0.001	SIGNIFICANT
CONTROL	0.83	P < 0.001	SIGNIFICANT
TOTAL	15.3	P < 0.001	SIGNIFICANT

Interpretation: Intra-group comparison of mean score of MDQ pre and post intervention in group A(Isometric exercise group). There was significant difference observed in all subcomponents. This suggests that group A intervention showed significant improvement in all subcomponents of MDQ post intervention at 8 weeks.

Table 3 Showing The intra-group comparison of group B showing mean values at pre and post 8 weeks

	Mean difference	p value	INTERPRETATION OF p value
PAIN	5.76	P < 0.001	SIGNIFICANT
CONCENTRATION	4.43	P < 0.001	SIGNIFICANT
BEHAVIOURAL CHANGES	3.6	P < 0.001	SIGNIFICANT
AUTONOMIC REACTIONS	0.8	P < 0.001	SIGNIFICANT
WATER RETENSION	1.56	P < 0.001	SIGNIFICANT
NEGATIVE EFFECTS	7.3	P < 0.001	SIGNIFICANT
AROUSAL	2.23	P < 0.001	SIGNIFICANT
CONTROL	0.86	P < 0.001	SIGNIFICANT
TOTAL	27.6	P < 0.001	SIGNIFICANT

Interpretation: Intra-group comparison of mean score of MDQ pre and post intervention in group B (Yogasana). There was significant difference observed

in all subcomponents. This suggests that group B intervention showed significant improvement in all subcomponents of MDQ post intervention at 8 weeks.

Table 4, shows intergroup comparison of the mean difference of group A and Group B using unpaired t test .

	GROUP A	GROUP B	p value	INTERPRETATION OF p value
PAIN	4.13	5.76	P < 0.001	SIGNIFICANT
CONCENTRATION	2.03	4.43	P < 0.001	SIGNIFICANT
BEHAVIOURAL CHANGES	2.43	3.6	P < 0.001	SIGNIFICANT
AUTONOMIC REACTIONS	0.56	0.8	P < 0.001	SIGNIFICANT
WATER RETENSION	1	1.56	P < 0.001	SIGNIFICANT
NEGATIVE EFFECTS	2.73	7.3	P < 0.001	SIGNIFICANT
AROUSAL	1	2.23	P < 0.001	SIGNIFICANT
CONTROL	0.83	0.86	P < 0.001	INSIGNIFICANT
TOTAL	15.3	27.6	P < 0.001	SIGNIFICANT

Interpretation: Shows comparison of mean difference in group A and group B at end of 8 weeks. Data were analyzed using unpaired t test. Results suggest that improvement in group B (Yogasana) was more than group A and difference was statistically significant. (p < 0.05)

Discussion

Primary dysmenorrhea (PD) is described as pain during the first days of menstruation cycle beginning with the onset of the ovulatory cycle (usually 6 to 12 months after menarche) in the absence of pelvic pathology. Based on current scientific knowledge in primary dysmenorrhea progesterone withdrawal prior to menstruation leads to release of arachidonic acid. Arachidonic acid triggers inflammatory response and

vasoconstriction via release of prostaglandins (PGs) and leukotrienes (LTs)^(11,12). PGs cause contraction of uterus frequently and arrhythmically. Uterine contractions lead to vasoconstriction resulting increased sensitivity of peripheral nerves. All this process results in primary dysmenorrhea^(6, 13). Exercises increases release of anti-inflammatory cytokines such as IL-10 and IL-1ra and inhibits pro-inflammatory cytokines IL-1 beta and TNF-alpha 20 or metabolic factors i.e. promotes substrate utilization (a shift from anaerobic glycolysis to aerobic respiration), reduces secretion of lactate ultimately leading to reduction in pain.⁽¹⁴⁾

The improvement in pain component in group A could be due to isometric exercises of targeted muscle. Contraction of these muscles facilitates bleeding and excretion of waste containing prostaglandins relieving

pain, as prostaglandin were primary source of painful contraction⁽⁸⁾. It also controls pelvic movement by reducing muscular imbalance and reduces the activity of sympathetic system which causes contraction and pain in uterine muscles⁽⁵⁾. A study done by Sara Azim et al investigated effect of isometric exercises as a primary treatment of dysmenorrhea. The study concluded that 8 weeks of isometric exercise reduced the intensity and duration of primary dysmenorrhea.⁽⁸⁾

The significant difference in breast tenderness, weight gain and skin disorders in subcomponent of water retention could be probably due to correction of electrolyte imbalance caused by fluctuation in hormonal levels. Exercise training has been shown to decrease rennin and increase estrogen and progesterone levels leading to improvement of symptoms of water retention and swelling⁽¹⁵⁾.

Mechanism behind physical activity may help in faster transfer of waste products and prostaglandins as root of menstruation pain in uterine muscle⁽⁶⁾. Light to moderate intensity exercises reduce stress, anxiety, depression and improve mental health, as the negative effects on the body seem to be exaggerated in people who are inactive, a phenomenon called stress-induced/exercise deficient. Exercise, a natural remedy for negative effects because it releases powerful endorphin chemicals in the brain, which act like the body's built-in painkillers and mood-lifters⁽¹⁶⁾.

Yoga doesn't only target any particular organ or system, it treats individual as whole bringing harmony to body and mind. A study done by Usha Nag and Madhavi Kodali explored Yoga and pranayam as alternative therapy for primary dysmenorrhea. Asanas not only strengthen muscles around pelvis and lower abdomen but also work on muscle flexibility, cramps, mobility of joints as well. Controlled and regulated breathing pattern practiced during yogasan is reported to induce not only local relaxation but also general sense of well being. In current study yoga group had significant reduction in muscle stiffness, headache, cramps, backache and other symptoms of Pain⁽⁹⁾. The Bhujangasan and Setubandhasan stretch anterior abdominal wall. These

positions have seen to have increased blood supply to peritoneal cavity. This increased blood flow helps in washout of inflammatory mediators like PGs leading to relief of pain.⁽¹⁰⁾

The significant reduction in anxiety, depression, mood swings and other components were noticed. Significant reduction in insomnia, distraction and other component in Concentration subcomponent were seen. Correlation of mind to body is a circle in dysmenorrhea. It's a vicious circle i.e. pain perceived by body leads to stress and stress increases secretion of inflammatory mediators to increase pain. Yogasana helps in breaking this cycle by locally reducing the pain at musculoskeletal system and corrected breathing pattern leading to central relaxation⁽¹⁷⁾. A study done by Dianne Groll, a Danielle Charbonneau suggests that yogasan has higher influence on sympathetic and parasympathetic system modulating GABAergic activity hence is helpful in reducing negative emotions like anxiety⁽¹⁸⁾. Yogasan is also seen to have effect on vagus nerve activity and adrenal gland leading to decreased cortisol secretion. These parasympathetic activities leads to better undisturbed sleep pattern.⁽¹⁷⁾

This study had significant reduction in Control, Behavioural changes and Arousal subcomponents post 8 weeks intervention. Behavioural changes are under influence of autonomous nervous system. Since yogasan has inhibitory effect on sympathetic system leading to change in neurotransmitters and hormone levels; it results in reduction of these components.⁽¹⁹⁾

In this study, in intergroup comparison group B (yoga group) showed greater decrease in total score of Moos Menstrual Distress Questionnaire than group A (Isometric exercise) which is significant ($p < 0.05$).

Stress has potentiality to increase sympathetic activity and can enhance dysmenorrhea through increase of sympathetic system stimulation. Exercise is crucial stress moderator. Intervention studies have established that practice of exercise is seen to help in release of endorphins and enkephalins which modulates pain threshold. This whole process results in reduction in pain perception⁽⁶⁾.

A study done by Ratna Sharma*, Nidhi Gupta and R. L. Bijlan explored effect of Yoga on feeling of well being. This study suggested that combined practice of yoga and pranayam has significantly good results on subjective feeling of well being in merely 10 days. Feeling of well being is related to reduction of stress, anxiety and depression. So besides musculoskeletal benefits of yogan it also induces sense of well being and reduction in negative emotions like anxiety and depression. (20). Studies have demonstrated reduction of stress can be improving symptoms of dysmenorrhea (8).

Present study shows significant reduction in distress related to dysmenorrhea in yoga group than isometric exercise group. Yoga also has advantage of being safe and doesn't need fancy props neither bigger area to perform and is extremely efficient in pain reduction.(21) Therefore, yoga can be effectively used as an alternative therapy for primary dysmenorrhea.

Conclusion

It is concluded that both lower limb and abdominal isometric exercises and yoga asanas help in reducing distress related to primary dysmenorrhea according to Moos Menstrual distress questionnaire. However, yoga group was more effective in reducing distress related to primary dysmenorrhea than isometric exercise group.

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