



EFFECTIVENESS OF YOGA VERSUS CHAIR AEROBIC EXERCISES IN FEMALES WITH PRIMARY DYSMENORRHEA WITHIN AGE GROUP 19-25 YEARS: A COMPARATIVE STUDY

¹Madhuri Gaikwad, ²Dr.Kalpna Deshmukh, ³Dr.Jaywant Nagulkar, ⁴Dr.Shaheen Sheikh, ⁵Dr.Shruti Chaudhari

¹Intern, ²Assistant Professor, ³Principal/Professor, ⁴Professor, ⁵Assistant Professor

¹⁻⁴Dr.Ulhas Patil College of Physiotherapy, Jalgaon, India.

Abstract:

Background: Dysmenorrhea is the medical term for pain with menstruation. It is the most common gynaecological disorder among female adolescents with prevalence of 60% to 93%. Primary Dysmenorrhea refers to pain that is not associated with any identifiable pelvic pathology. It is characterized by lower abdominal pain which may radiate to thighs and lower back. Associated complaints include nausea, vomiting, mood swings, headache, fatigue and diarrhea.

Aim: To compare the effectiveness of Yoga and Chair Aerobic exercises in females with primary dysmenorrhea within age group 19-25 years.

Methodology: This study was a comparative study which included 38 subjects with primary dysmenorrhea of age group between 19-25 years. Subjects were divided into 2 groups with simple random sampling method. Group A (n=19) was given Yoga and Group B (n=19) was given Chair Aerobic exercises for 4 days/week for about 6 weeks. Patients were evaluated at baseline and after 6 weeks of intervention on the basis of NPRS for pain intensity and VMSS for severity of dysmenorrhea.

Result: Subjects in both the groups did not have any significant difference in mean ages as p value 0.832 (<0.05). Intragroup comparison result showed that NPRS and VMSS scale were statistically significant in both the groups (p <.001). Whereas intergroup comparison result showed that Yoga was more statistically significantly in reducing pain intensity (p 0.047) and severity (p 0.011) than Chair Aerobic exercise in females with primary dysmenorrhea.

Conclusion: The present study concludes that 6 weeks of Yoga and Chair Aerobic exercises are effective in reducing pain and severity in females with primary dysmenorrhea. In addition, results supported that among Yoga and Chair Aerobic exercise, Yoga is more significantly effective in reducing pain intensity using (NPRS) and severity using (VMSS) in females with primary dysmenorrhea.

Keywords: Chair Aerobic exercise, NPRS, Primary dysmenorrhea, VMSS, Yoga.

INTRODUCTION

Dysmenorrhea is the medical term for pain with menstruation.¹ The word Dysmenorrhea is obtained from Greek word "Dys" (difficult, painful, abnormal), "Meno" (month) and "rrhea" (flow).² It is the most common Gynaecological disorder among female adolescents with prevalence of 60% to 93%.^{3,4} It is one of the most important causes of absenteeism among adolescent girls as it affects their academic performance and also has a negative impact on quality of life.⁵

There are two types of Dysmenorrhea: Primary and Secondary. Primary Dysmenorrhea refers to pain that is not associated with any identifiable pelvic pathology.⁶ It is characterized by lower abdominal pain

which may radiate to thighs and lower back. Associated complaints include nausea, vomiting, mood swings, headache, fatigue and diarrhea. Causes are excessive myometrial contractions, ischemia and excessive prostaglandin production.² Secondary Dysmenorrhea refers to pain that occurs due to the presence of organic pelvic pathology such as Fibroids, Adenomyosis, Pelvic inflammatory disease (PID) and Endometriosis.⁶

The main cause for menstrual pain is ischemia. Uterine contractions are caused due to release of prostaglandins in the endometrium during menstruation. Hence, the blood supply to the uterine muscles gets constricted and muscles go into spasm. Due to this there is rise in tension. This in turn produces ischemia of muscles leading to cramps.^{7,8} Pelvic and extra pelvic organ functioning is improved by physical activities by adjusting metabolism and increasing blood circulation is a proven fact.⁹

One study showed that a majority (98%) of adolescents used non pharmacological methods such as heat, rest and distraction to treat dysmenorrhea, with perceived effectiveness of 40% or less.¹⁰

Management of primary dysmenorrhea are: Medical management- NSAID's such as ibuprofen, mefenamic acid and naproxen.¹¹ Non pharmacological treatment- Aromatherapy, Acupuncture, Behavioral interventions, Dietary therapies.¹² Physiotherapy management- Hot pack, TENS, Massage, Yoga, Active stretching, Core strengthening, Aerobic exercises.^{12,13,14} Various other studies have shown different forms of exercise such as Core strengthening and Active stretching to be beneficial in coping with menstrual pain.¹⁵

1) YOGA:

Yoga word comes from a Sanskrit root "yuj" which means union or yoke to join and to direct and concentrate ones attention.¹⁶ The physical benefits of yoga are linked to the release of beta endorphins and the shift caused in neuro transmitter levels linked to emotions such as dopamine and serotonin.^{17,18} Yoga combines physical exercise, mental meditation and breathing techniques to strengthen the muscle and relieve stress.¹⁹

Yoga when performed as a part of an exercise program helps in improving general health, improves flexibility, strengthen muscles and reduces pain.²⁰ Therefore, Yoga can help mind and body adapt with stress, anxiety and depression making the person feel relaxed and calm.¹⁹ Besides attaining physical fitness, Yoga helps in reduction of the sympathetic nervous system tone and increase vagal activity, both of which could have favourable endocrine and immune consequences, including lowering inflammation.^{21,22}

Various Yoga postures have proven to be beneficial in alleviating symptoms related to menstrual pain.²³

2) CHAIR AEROBIC EXERCISES:

"Aerobic" is defined as "relating to, involving, or requiring free oxygen", and refers to the use of oxygen to adequately meet energy demands during exercise via aerobic metabolism. The American College of Sports Medicine (ACSM) defines Aerobic exercise as "any activity that uses large muscle groups, can be maintained continuously and is rhythmic in nature." It is a type of exercise that overloads the heart and lungs and causes them to work harder than at rest.

It is physical activity of low to high intensity which is performed while sitting on a chair and it depends primarily on the aerobic energy generating process.²⁴

This exercise also includes warm up and cool down period. The warm up period allows for a gradual increase in the heart rate and may reduce the risk of injuries and the cool down period allows the body to clear acid that has built up in the muscles and allows more blood back in to the circulation which in turn helps to prevent muscle cramps.²⁵

Pain in general has disabling nature and makes dysmenorrhea stressful and it can become irritating factor in life of lots of young adult females. Some are completely cramped to bed and some are able to functions daily activities but with support of analgesics. However, analgesics are not an effective solution and increasing dependency. Therefore, this study was conducted to replace the medications with the exercises in primary dysmenorrhea.

There are different exercises that have been studied individually on primary dysmenorrhea. And also, there are research on Yoga and Chair Aerobic exercises separately or comparing with other techniques but there is no study on comparing this both technique in primary dysmenorrhea.

So, the present study was conducted to find the effect of Yoga & Chair Aerobic exercises in primary dysmenorrhea to reduce pain and severity of dysmenorrheal and to compare the effect of Yoga and Chair Aerobic exercises in primary dysmenorrhea to reduce pain and severity of dysmenorrhea.

METHODOLOGY

1) **Study Design:** Comparative Study

2) **Sample Size:** 38

Sample Size Calculation: Sample Size for Equality of Two Means

Where, $M_1 = 0.96$; $M_2 = 1.44$; $S_1 = 0.73$; $S_2 = 0.65$; $S = 0.69$; $Z_1 = 1.64$; $Z_2 = 1.28$

$$= \frac{2 S^2 (Z_1 + Z_2)}{(M_1 M_2)}$$

Minimum Sample Size (N)= 36

3) **Study Population:** Females Within Age Group 19-25 Years

4) **Study Duration:** 6 Months

5) **Sampling Method:** Simple Random Sampling

6) **Study Setting:** Institutions and Hostels in And Around Jalgaon City

7) **Criteria Of Selection:**

(A) **INCLUSION CRITERIA:**

Females with 1) Age group between 19 to 25 years

2) Regular menstrual cycle (28-30 days)

3) Pain intensity = ≥ 4 (on NPRS)

4) Subjects having pain on 1st day or entire period of menstruation

5) On VMSS = Grade 2 or 3

6) Other symptoms during menstruation such as headache, nausea, etc.

(B) **EXCLUSION CRITERIA:**

Females with 1) Irregular menstrual cycle

2) Secondary dysmenorrhea condition

3) Performing any moderate to severe physical exercise regularly

4) Professional athlete or sports person

5) Pelvic disease such as PCOS, PID, Endometriosis, fibroids, etc.

6) Married females

7) H/O psychological and chronic inflammatory disease

8) H/O recent hospitalization due to Gynecological disease

9) Any recent medical, surgical or gynecological history (within 2months)

10) Subjects not able to perform exercise regularly.

8) **Materials:** 1) Pen

2) Chair

3) Yoga mat

4) Watch

5) Consent form and patient evaluation sheet

6) Assessment sheet

OUTCOME MEASURES

1) **Numerical Pain Rating Scale (NPRS):-** Pain intensity was assessed using Numerical Pain Rating Scale (NPRS). The reliability of the scale is 0.96

2) **Verbal Multidimensional Scoring System (VMSS):-** Severity of dysmenorrhea was assessed using Verbal Multidimensional Scoring System. The reliability of the scale is 0.92.

PROCEDURE

➤ Ethical clearance was taken from the ethical committee of Dr. Ulhas Patil College of Physiotherapy, Jalgaon prior to the commencement of the study.

➤ Subjects was taken according to the inclusion and exclusion criteria.

➤ Prior to starting the study, the procedure was explained and a written consent form was taken from the subjects. Then patient evaluation sheet was given to the subjects and ask them to fill it correctly.

- 38 subjects were divided into 2 groups (group A and group B) by simple random sampling method (chit method), 19 subjects in each group.
- They were explained about the study and given information about how it would benefit them.
- Then pre-test assessment was taken using the Numerical Pain Rating Scale (NPRS) for assessing pain intensity and Verbal Multidimensional Scoring System (VMSS) for assessing severity of dysmenorrhea on the 1st day prior to starting the exercise.
- Exercise had started just after the menstruation period end.
- Post assessment was taken using NPRS and VMSS scale based on 1st menstrual cycle after the completion of intervention period (6 weeks).
- Subjects were asked not to take medicine to relieve menstrual pain during the intervention period.

1. **Group A** (n=19) were made to perform Yoga asana for 4 days per week for about 6 weeks, of which 1 was supervised session and remaining 3 days of week was for rest. (Exercises was not performed at the time of menstruation). Pre assessment was taken on the 1st day.

The following asana were performed by the subjects:

- 1) Bhujangasana (cobra pose)
- 2) Matsyasana (fish pose)
- 3) Bidhalasana (cat pose)
- 4) Janusirsasana (head to knee forward bend pose)
- 5) Vajrasana (diamond pose)
- 6) Pavanmuktasana (knee to chest pose)

Warm up period for 5-10 minutes = Anulom vilom, stretching of hamstring, quadriceps and calf muscles.

Yoga asana had performed for 35-40 minutes. Every asana was maintained for atleast 10-30 seconds and performed for 5 repetitions. 30 seconds rest in between 2 asanas. In the rest time subject could drink water 1 or 2 sips if she feels dehydrated.

Cool down period for 5-7 minutes = Shavasana pose.

Total duration of the Yoga was around 50-60 minutes.

Post assessment was taken at the end of 6 weeks.

2. **Group B** (n=19) were made to perform Chair Aerobic exercises for 4 days per week for about 6 weeks, of which 1 session was supervised and remaining 3 days of week was for rest (Exercises was not performed at the time of menstruation). Pre assessment was taken on the 1st day.

The following exercises were performed by the subjects:

- 1) Knee lift
- 2) Diagonal toe touch
- 3) Lunges
- 4) Punches
- 5) Flick kick
- 6) Half jack

Warm up period for 5-10 minutes = Jumping Jacks, Circumduction of shoulder clockwise and anticlockwise, Trunk rotation, Stretching of hamstring, calf muscles.

Chair Aerobic exercises was performed for 25-30 minutes. Each exercise was performed for 10 repetitions of each side. In between the rest time subject could drink water if she feels dehydrated. Subject was instructed not to hold her breath during exercise.

Cool down period for 5-10 minutes = slow marching, stretching for hamstring, quadriceps and calf muscles.

Total duration of the exercise was around 40-45 minutes.

Post assessment was taken at the end of 6 weeks.

YOGASANA

- 1. BHUJANGASANA:** Use Yoga mat preferably. Starting position in prone with legs together and your palms down under your shoulders. Rest your feet and forehead on the floor. While inhaling bring your head up, then your chin against the floor. Now lift your hands and use your back muscles to raise your chest as high as possible. Hold for 10-30 seconds and exhale slowly and return to starting position. It should be performed for 5 repetitions.²⁶



- 2. MATSYASANA:** Starting position was supine. Lie down on your back with your legs straight and your feet together. Place your palms underneath your thighs. Pressing down your elbow, slowly inhale and arch your back. Drop your head down so that the top of your head is on floor, but your weight should rest on your elbows. Hold the position for 10-30 seconds and then slowly exhale and come back to the starting position. It should be performed for 5 repetitions.²⁶



- 3. BIDALASANA:** Starting position quadruped. Position your hands directly beneath your shoulders and your knees directly beneath the hips. Make your back horizontally flat. Your spine will be at full extension with both the front and back sides equally long. When you are ready to begin breath in deeply. Do this gently pulling the abdominal muscle backwards towards the spine and gently contracting the buttocks. Press firmly downward with your hands to stay lifted out of the shoulders and press the middle of your back toward ceiling, rounding your spine upward. Hold for 10-30 seconds and come back to starting position. It should be performed for 5 repetitions.²⁶



- 4. JANUSIRSASANA:** Sit on the floor. Place the left heel pressing hard near the left groin. Keep the right leg stretched and straight. Hold the right foot with the hands. Exhale and draw the stomach in. Lower the head slowly as shown in the figure. Place the forehead and the chin on the knee. Remain in this position for 10-30 seconds. Repeat it for 5 times.²⁷



- 5. VAJRASANA:** Starting position was sitting on the floor. Bend the legs at the knees. Place the heels at the sides of the anus in such a way that the thighs rest on the legs and the buttocks rest on the heels. Support the whole body on the knees and the ankles. Breathe normally while performing this asana. The knees and ankles will perhaps ache in the beginning but this ache or pain will disappear by itself. Stretch the arms and place the hands on the knees. Keep the knees close by. Sit erect keeping the trunk, neck and head in a straight line. Hold this position for 10-30 seconds and repeat it for 5 times.²⁷



- 6. PAVANMUKTASANA:** Also called as APNASANA. Starting position was supine. Lie flat on the back, keep the heels of both the legs together. Inhale deeply and bend the knees towards the stomach and hold it with both the hands. Raise the head above the floor and bring the chin closer to the knees so that it touches the knee-cap. Exhale and press the muscles of the right abdomen with the right thigh. Keep the stomach pressed till the breath is suspended. Hold the position for 10-30 seconds and it should be performed for 5 repetitions.²⁷



CHAIR AEROBIC EXERCISES

- 1. KNEE LIFT:** The subject should be made to sit on a chair with proper posture. Then perform a marching action by lifting a left knee (thereby raising the left foot off the floor), placing it down and then repeating with the right foot. It should be done for 10 repetitions of each leg alternately.²⁸



2. **DIAGONAL TOE TOUCH:** Sit in a chair so that your feet are flat on the ground, with one extended slightly ahead of the other. Raise your arms above your head and steadily reach down and forward towards your extended foot. Try to touch your toes. Hold for 2 counts and return to the original position. Bring your arms to your sides. Repeat the same for other leg. It should be done for 10 repetitions of each leg.²⁹



3. **LUNGES:** Starting position was standing with the chair behind you, and pick up and place one feet at top of the chair so that you're in a staggered stance with your back foot elevated. Keep your torso erect as you bend your lead or front knee to lower your body towards the floor. Once your lead knee is bent to 90 degrees, extend it to raise your body back up. Go right into the next repetition, continuing until you're finished. Do with the opposite legs. It should be done for 10 repetitions of each side.³⁰



4. **PUNCHES (FRONT JABS):** Starting position was sitting. Then bring your two clenched fists to your jaw line. Quickly alternate between extending the right arm fully then the left. Squeeze your core, chest and arm muscles with each swing. It should be performed for 10 repetitions of each arm.³¹



5. **FLICK KICK:** Raise the left knee upward as you straighten the leg (as if performing a kick). Lower and repeat on the right side. Continue alternating kicks with the left and right legs. 10 repetitions of each leg.²⁸



6. **HALF JACK:** Starting position was sitting and keep knees together and arms hanging by your side (or crossed in front of the stomach). Jump the left foot out to the side, whilst raising the left arm up and out to the side. Return to the starting position. Repeat either continuing on the left side or alternating left and right side. It should be performed for 10 times each side.²⁸



STATISTICAL ANALYSIS

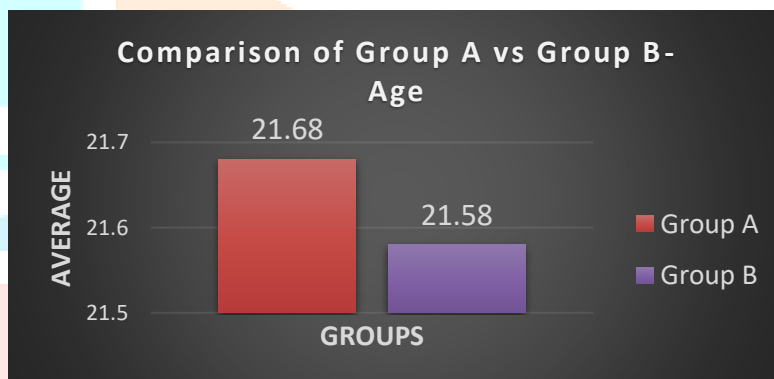
The data was collected, analysed and was entered in excel sheet and statistical analysis was done using SPSS statistical package of social sciences version 28.0.1.1 software. The statistical analysis was done using paired and unpaired t-test. Paired t-test was used for statistical analysis to compare pre and post intervention values within groups. The unpaired t-test was used for between groups statistical analysis to compare post intervention values of both the groups. Statistical significance was set at $p \leq 0.05$.

RESULTS

- The present study included 38 subjects with primary dysmenorrhea who met the inclusion criteria. The subjects were equally divided into two groups by simple random sampling method (chit method). Group A and Group B both consisted 19 subjects. Group A received Yoga and Group B received Chair Aerobic exercise for primary dysmenorrhea.
- As shown in table 1 and graph 1, the mean for group A was 21.68 ± 1.57 and for group B was 21.58 ± 1.46 respectively. There was no significant difference in mean ages as p value was 0.832.

Variables	YOGA (Group A)	CHAIR AEROBICS (Group B)	t value	p value	Significance
Age (Mean \pm SD)	21.68 ± 1.57	21.58 ± 1.46	0.214	0.832	Not significant
Pain duration (in days) (Mean \pm SD)	2.42 ± 0.77	2 ± 0.94	1.509	0.14	Not significant

Table 1: Baseline characteristics of both groups

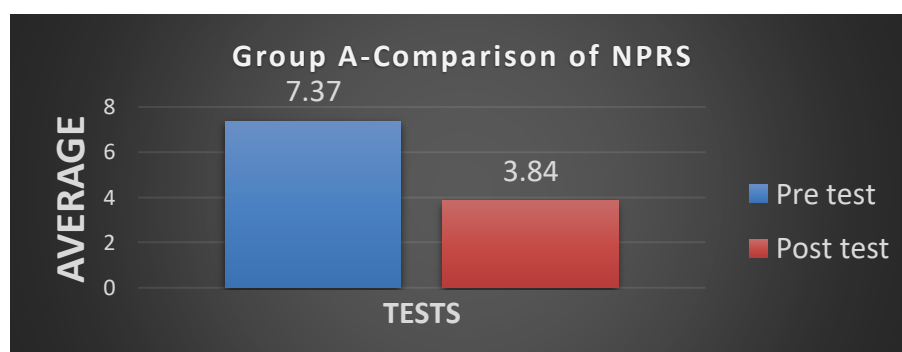


Graph 1: Comparison of group A vs group B – Mean age

- Intra group comparison of pre and post data value of NPRS and VMSS in group A. The pre data of NPRS mean was 7.37 with SD 1.46; when it was compared with post mean 3.84 with SD 1.34, the obtained p value was $<.001$ which represents there was significant improvement in pain intensity after intervention (table 2& graph 2).

Test	n	Mean	SD	t value	p value	Significance
Pre test	19	7.37	1.46	13.676	$<.001$	highly significant
Post test	19	3.84	1.34			

Table 2: Comparison of pre and post intervention NPRS of group A

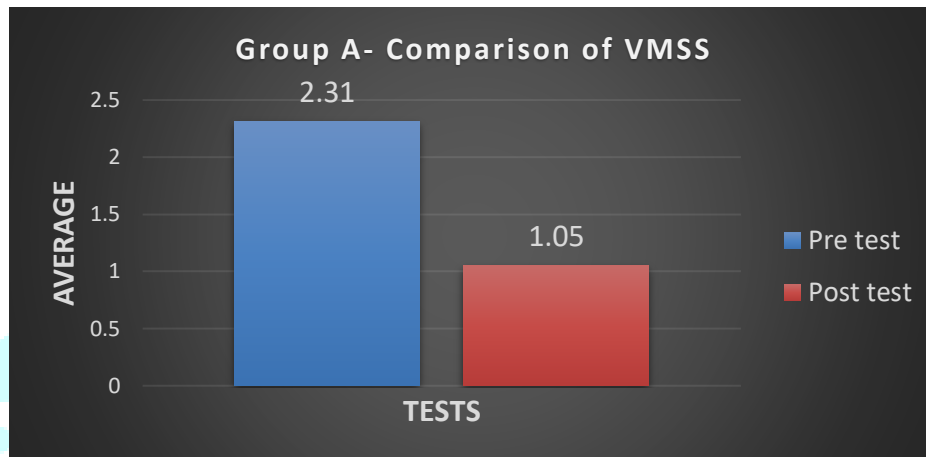


Graph 2: Comparison of pre and post intervention NPRS of group A

- The pre data VMSS of group A mean was 2.31 with SD 0.48; when it was compared with post mean of 1.05 with SD 0.70, the obtained p value was <.001 and statistically significant difference was found pre and post data in Yoga for primary dysmenorrhea (table 3 and graph 3).

Test	n	Mean	SD	t value	P value	Significance
Pre test	19	2.31	0.48	6.315	<.001	highly significant
Post test	19	1.05	0.70			

Table 3: Comparison of pre and post intervention VMSS of group A

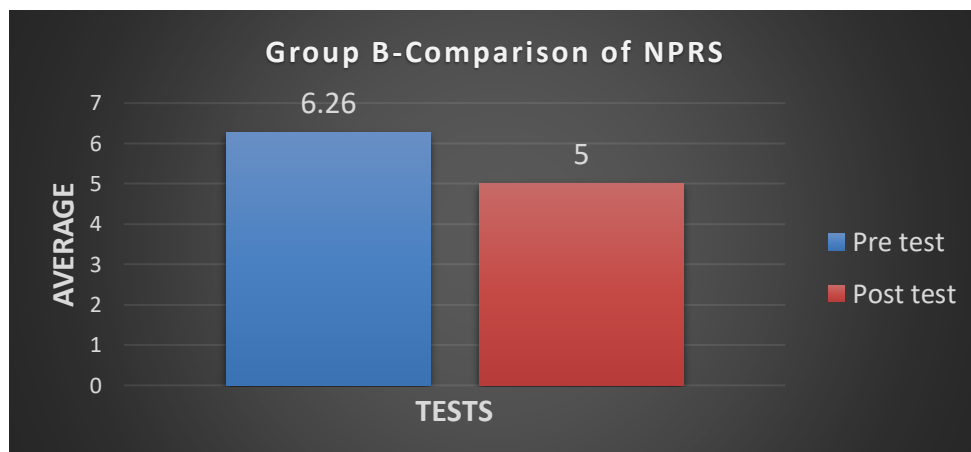


Graph 3: Comparison of pre and post intervention VMSS of group A

- Within group comparison of pre and post data value of NPRS and VMSS in group B. The pre data of NPRS mean was 6.26 with SD 1.59; when it was compared with post mean 5 with 2.05, the obtained p value was <.001 and statistically significant difference found between pre and post data (table 4 and graph 4).

Test	n	Mean	SD	t value	P value	Significance
Pre test	19	6.26	1.59	4.288	<.001	highly significant
Post test	19	5	2.05			

Table 4: Comparison of pre and post intervention NPRS of group B

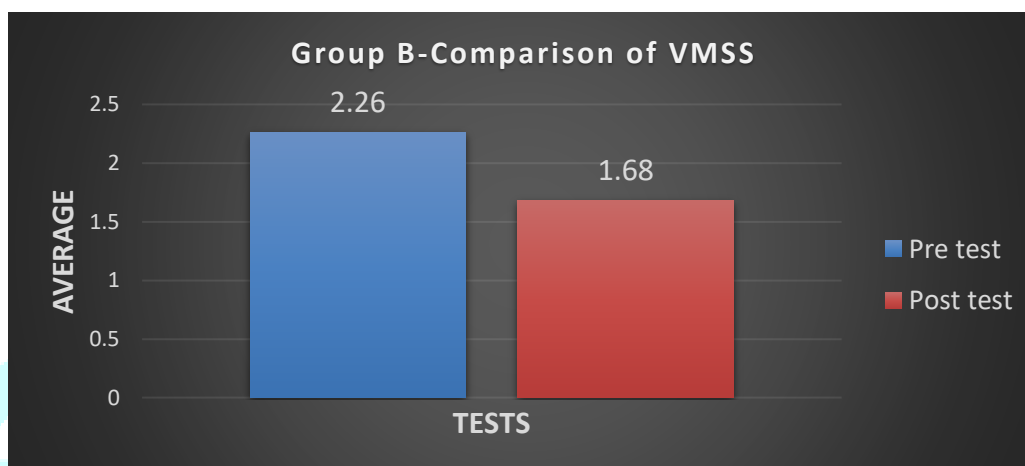


Graph 4: Comparison of pre and post intervention NPRS of group B

- The pre data VMSS of group B mean was 2.26 with SD 0.45; when it was compared with post mean of 1.68 with SD 0.74, the obtained p value was <.001 and statistically significant difference was found between pre and post data in Chair Aerobic for primary dysmenorrhea (table 5 & graph 5).

Test	n	Mean	SD	t value	P value	Significance
Pre test	19	2.26	0.45	4.158	<.001	Highly significant
Post test	19	1.68	0.74			

Table 5: Comparison of pre and post intervention VMSS of group B

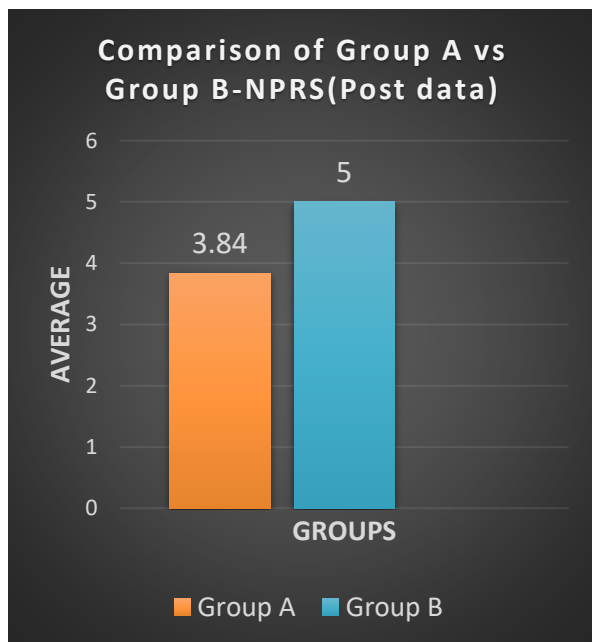


Graph 5: Comparison of pre and post intervention VMSS of group B

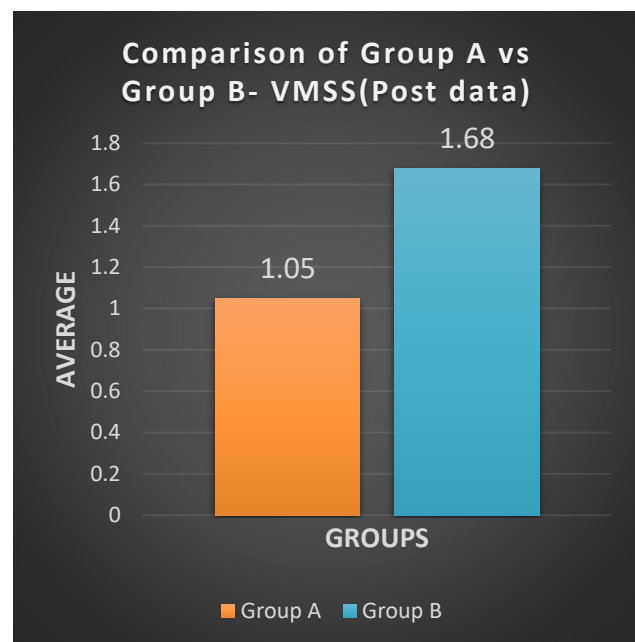
- Inter group comparison of post data between groups (table 6). In group A post data value of NPRS mean was 3.84 with SD 1.34; when it was compared with group B value with mean of 5 with SD 2.05, the obtained p value was 0.047 and statistically significant difference was found between groups (graph 6).
- Between group comparison of post intervention value of VMSS mean was 1.05 with SD 0.70; when it was compared with group B value with mean of 1.68 with SD 0.74, the obtained p value was 0.011 which indicate there was statistically significant difference in VMSS values of group A and group B subjects (table 6 and graph 7).

Outcome Measures	Pre/Post Intervention	Mean± SD	Mean ± SD	t value	p value	Significance
		YOGA (Group A)	CHAIR AEROBIC (Group B)			
NPRS	Pre	7.37± 1.46	6.26 ± 1.59	2.229	0.032	Significant
	Post	3.84 ± 1.34	5 ± 2.05	-2.055	0.047	Significant
VMSS	Pre	2.31 ± 0.48	2.26 ± 0.45	0.349	0.729	not significant
	Post	1.05 ± 0.70	1.68 ± 0.74	-2.676	0.011	significant

Table 6: Between groups comparison of outcome measures of pre and post data



Graph 6: Between groups comparison of post data NPRS



Graph 7: Between group comparison of post data VMSS

DISCUSSION

This study was designed to compare the effectiveness of Yoga and Chair Aerobic exercise in females with primary dysmenorrhea within age group 19-25 years. This study provides the evidence for short term effectiveness and also proves the efficacy of Yoga asana and Chair Aerobic exercise in reducing pain intensity and severity of primary dysmenorrhea. In comparison between these intervention for their effectiveness, it was found that Yoga is more effective than Chair Aerobic exercise in reducing pain intensity and severity of dysmenorrhea.

Statistical analysis proves that both Yoga and Chair Aerobic exercise are significantly effective in reducing pain and severity of primary dysmenorrhea with p-value <.001 for NPRS and p value <.001 for VMSS. When comparing between groups the study shows that there is more significant effect of Yoga in reducing pain intensity with p value 0.047 and severity of dysmenorrhea with p value 0.011 than Chair Aerobic exercise. Hence, the study rejects null hypothesis.

In accordance with the present study, a study by Shraddha Prabhu et al. (2019) on the effect of Yoga asanas on menstrual cramps in young adult females in primary dysmenorrhea which concluded that 6 weeks of Yoga asana can be used in reducing menstrual pain (p value= 0.0001)²³, supporting the result of a current study in which pain intensity and severity of primary dysmenorrhea has been reduced with p value <.001.

In accordance with the present study, a study by Chaitany Patel et al. (2020) on Effect of Chair Aerobic exercises vs. effect of Core Strengthening exercises with education on Primary Dysmenorrhea in adult girls-RCT which proved that 8 weeks of Chair Aerobic exercise is significantly helped in improving the quality of life as well as reducing the symptoms of dysmenorrhea with p value <0.0001³², supporting the result of a current study in which Chair Aerobic exercise is effective to reduce pain and severity of dysmenorrhea with p value <.001.

Yoga is known to play an important role in reducing stress and sympathetic activity, increasing parasympathetic activity, improving ones quality of life and also by decreasing psychological symptom levels. It may also be useful for managing primary dysmenorrhea by reducing menstrual pain. Yoga helps in increasing the flow of vital energy to the reproductive organs and establishes a balance among hormones regulating menstruation.²³

Several poses assumed in Yoga can have beneficiary effect on dysmenorrhea symptoms. Yoga poses have specific benefits too.³³ Bhujangasana improves spinal flexibility, strengthen back muscles and stretching the abdominal muscles.^{20,23} In women it tones up ovaries and uterus and thereby alleviating menstrual pain and reducing stress.²³ Matsyasana promotes cervical flexibility and decreases neck along with shoulder stiffness.³³ It stretches and stimulates the organ of your belly.²⁶ Bidalasana initiates movement from center and coordinates movements and breath.²⁰ It helps in improving flexibility of the spine and also stimulates the abdomen increasing blood supply to the pelvic organs.²³ Janusirsasana stimulates the reproductive organs and therefore menstrual pain are reduced. It stretches groin and hamstrings.³⁴ Vajrasana helps in relaxation of pelvic floor muscles which reduces the stimuli passing through the spasmodic muscles leading to pain relief.²³ Pawanmuktasana stretches and stabilizes the pelvis and low back and can reduce lower back pain. Forward flexing compressed the abdomen and helps in stimulating the enteric nervous system.²³

This Yoga asana strengthen back muscles and massage the organs lies in the pelvic. By massaging it increases blood supply to the organs. With increase in blood supply to the organs, oxygen supply is also increased and give relief from muscles hypoxia which is the one common factor responsible for cramps in primary dysmenorrhea.²⁶

A study done by Gosavi Devangi R. et al showed that the main cause for menstrual pain is ischemia. Primary focus of Chair Aerobic exercises is to improve the cardiovascular fitness. Along with it, performing Chair Aerobic exercises also helps to reduce pain by release endorphins (the natural painkillers) by the brain which leads to rise in the pain threshold. Thus, the exercise has an analgesic effect against pain by increasing the blood circulation leading to pain reduction in primary dysmenorrhoea.³⁵

While comparing the results of both Groups A and B, the study reveals that Yoga showed better reduction in pain and severity of primary dysmenorrhea when compared with Chair Aerobic exercise. Because in yoga asana the poses which are selected are focused mainly on the abdomen region which thus helps to reduce pain more effectively. So, conservative protocols have got their importance in primary dysmenorrhea and should be advocated.

CONCLUSION

The present study concludes that 6 weeks of Yoga and Chair Aerobic exercise are effective in reducing pain and severity in females with primary dysmenorrhea. In addition, results supported that among Yoga and Chair Aerobic exercise the Yoga was more significantly effective in reducing pain intensity using (NPRS) and severity using (VMSS) in females with primary dysmenorrhea.

Therefore, it can be used as a home exercise programme and can also be implemented among females of age group 19-25 years in order to augment their menstrual well-being and it will also aid in improving physical fitness and it will help to reduce absenteeism from work and improve quality of life. It will also help individuals to participate in various activities during menstruation.

Hence, Yoga can be safely used for reducing symptoms related to primary dysmenorrhea.

LIMITATIONS

- 1) Sample size of the study was small in number.
- 2) Study was done for short duration (i.e. 6 weeks).
- 3) The assessment was taken prior to the commencement of the exercise protocol and then directly after completion of exercise protocol i.e. 6 weeks. In between no assessment had been taken.

FUTURE SCOPE

- 1) Future studies should be done with a larger sample size.
- 2) Future studies should also be done on secondary dysmenorrhea population.
- 3) Study can be done for longer duration.
- 4) Future studies should also include married women or females with age more than 25 years.
- 5) Further studies can be carried out to find the effects of these techniques on other outcome measures such as quality of life (SF-36), Moo`'s distress questionnaire and WaLLID score.

REFERENCES

1. Hawkins and Bourne. Shaw's Textbook of Gynecology. 16th ed.
2. Montoya JS. Menstrual disorders in adolescents: Topic in paediatrics. Bol Med Hos Infant Mex. 2012;69(1):60-72.
3. Alvin PE, Lit IF. Status of the aetiology and management of dysmenorrhea in adolescence. Paediatric. 1982 oct; 70(4):516-25
4. Campbell MA, McGrath PJ. Use of medication by adolescents for the management of menstrual discomfort. Arch Paediatric Adolescent Med. 1997;151(9):905-13.
5. De Sanctis V, Soliman AT, Elsedfy H, Soliman NA, Elalaily R, el Kholy M. Dysmenorrhea in adolescents and young adults: a review in different countries. Acta Biomed. 2016;87(1).
6. Padubidri V. Howkins and Bourne Shaw's Textbook Of Gynaecology. Elsevier India; 2008. Page No:471
7. Khan RL, Gynaecology, CBS Publication, 3rd ed, 279-80.
8. Wright J, Solange W. The Washington Manual Obstetrics and Gynaecology Survival Guide. Lippincott Williams and Wilkins. 2003.
9. Quintana LM, Heinz LN, Portes LA et al. Intuencia do nivel de atividade fisicana dismenorrhoea. Rev Bras Ativ Fisica Saude. 2010;22(2):85-8.
10. Campbell MA, McGrath PJ: Non-pharmacologic strategies used by adolescents for the management of menstrual discomfort. Clin J Pain 1999; 15:313.
11. Federação Brasileira das Associações de Ginecologia e Obstetrícia. Primary dysmenorrhea: Treatment. Rev Assoc Med Bras (1992) 2013;59:413-9.
12. Han SH, Hur MH, Buckle J, Choi JY, Lee MS. Effect of aromatherapy on symptoms of dysmenorrhea in college student: a randomized placebo-controlled clinical trial. The Journal of Alternative and Complementary Medicine, 2006;12:535-541.
13. Mavrellos D, Saridogan E. Current therapeutic approaches to managing dysmenorrhoea. Prescriber 2013; 24:31-4. Available from: <http://www.uq.summon.serialssolutions.com/>. [Last accessed on 2017 Aug 23].
14. Proctor M, Farquhar C. Diagnosis and management of dysmenorrhoea. BMJ 2006; 332:1134-8.
15. Sandeep Kaur, Prabhnoor kaur, Sarvanan Shanmugam, Manpreet Kaur. To compare the effect of stretching and core strengthening exercises on Primary Dysmenorrhea in Young females.
16. Laster J. The heart of Patanjali. Yoga J 1997; 137:134- 44
17. Bucksworth, J; Dishman, R, 2003. "Human kinetics". Exercise psychology.
18. Williams KA, Abildso C, Steinberg L, Doyle EJ, Epstein B, Smith D, Hobbs G, Gross R, Kelly G, Cooper L. Evaluation of the effectiveness and efficacy of iyengar yoga therapy on chronic low back pain. Spine 2009; 34:2066-2076
19. Carlson KJ, Eisenstat SA, Ziporyn TD: The Harvard Guide to Women's Health. Cambridge Harvard University Press, 1996.
20. Rakhshae Z. Effect of three yoga poses (cobra, cat and fish poses) in women with primary dysmenorrhea: a randomized clinical trial. Journal of Pediatric and Adolescent Gynecology 2011;24: 192-196.
21. Kiecolt-Glaser, J.K., Christian, L., Preston, H., Houts, C.R., Malarkey, W.B., Emery, C.F., Glaser, R., Stress, inflammation, and yoga practice. Psychosom. Med. 2010;72 (2):113-121.
22. Usha Nag, M.D., [Obg], Pg Dip, M.Sc [Yoga], Madhavi Kodali, M.D.,D.P.M. Effect of Yoga on Primary Dysmenorrhea and Stress in Medical Students. IOSR Journal of Dental and Medical Sciences. 2013 JanFeb; 4(1): 69-73.
23. Shraddha Prabu, Sanket N, Ashok S, Parag S. Effect of Yogasanas on menstrual cramps in young adult females with primary dysmenorrhea. Int J Physiother Res 2019; 7 (4): 3109-12
24. Chair Aerobics. Available at: <http://www.medicaldictionary.thefreedictionary.com/Chair+aerobics>.
25. Sutar A, Paldhikar S, Shikalgar N, Ghogey S. Effect of aerobic exercise on primary dysmenorrhoea in college students. J Nurs Health Sci.2016;20-4.
26. Shriwatri YH, Honkalas P, Kumar A. Effect of yoga on primary dysmenorrhea in secondary school girls. International Journal of Current Advanced Research. 2018;7(1):8931-4.
27. Dr. P.D. Sharma, Yoga asana and Pranayama for health book.
28. Chair-based- aerobic exercises: Information guide, www.Allactive.co.uk.2015
29. Courtney medical group az.com. Weakly exercise: seated toe touch.
30. <https://livehealthy.chron.com/chair-lunges-vs-walking-lunge-4501.html>
31. The Inquirer.com by Ashley B. Greenblatt. 5 easy exercises you can do from your chair, March 27(2018).

32. Patel C, Patel S, Prajapati S, Ladumor S. Effect of Chair Aerobic Exercises vs. Effect of Core Strengthening Exercises with Education on Primary Dysmenorrhea in Adult Girls-RCT. *Ann Rehabil Res Pract.* 2020; 1(1): 1001.
33. Aggarwal A, Rao T, Palekar T, Paranjape P, Singh G. Effect of Yoga asanas and pranayama on pain, severity and quality of life in primary dysmenorrhea. *International Journal of Medicine and public health.* 2020;10(1):38-42.
34. Kirthika V, Padmanabhan K, Sudhakar S, Aravind S, Praveen Kumar C R, Monika S. Efficacy of Yoga Asana and Gym Ball Exercises in the management of primary dysmenorrhea: A single-blind, two group, pretest-posttest, randomized controlled trial. *CHRISMED Journal of Health and Research.* 2018; 5:118-22.
35. Berde SD, Yadav TS, Gosavi PM. Effect of core strengthening exercises and chair aerobic exercises in primary dysmenorrhea. *Int J Health Sci Res.* 2019;9(3):77-82.

