



## Effect of Chair Aerobic Exercises vs. Effect of Core Strengthening Exercises with Education on Primary Dysmenorrheal in Adult Girls-RCT

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### Abstract

**Background:** Dysmenorrhea is the medical term for pain with menstruation. In Indian female population Prevalence of dysmenorrhea is about 70.2%. There are two types dysmenorrhea of: Primary and secondary. Primary dysmenorrhea is common menstrual cramps that are recurrent accompanied by nausea, vomiting, fatigue and diarrhea and typically lasting from 12 h to 72 h.

**Objective:** To compare effectiveness of chair aerobic exercises vs. core strengthening exercises with education on primary dysmenorrhea in adults girls.

**Materials and Methods:** Subjects taken form Shree B.G. Patel College of Physiotherapy, Anand were screened and 100 subjects were divided in two groups i.e. Group A chair Aerobic exercise and Group B core strengthening exercises. Outcomes measures were assessed at baseline and after 8 weeks.

**Results:** Intra group comparison results showed that MOOS questionnaire WaLLID Score and SF-36 scale were significant difference in both the groups (0.0001). Whereas inter group comparison results showed that chair aerobic exercises was statistical significant in reducing MOOS Questionnaire score, WaLIDD Score and SF-36 score.

**Conclusion:** The study concludes that the effect of 8 weeks program of chair aerobic exercises and core strengthening exercise reduce the severity of the symptoms of dysmenorrhea. The present study provide evidence to support to the use of both chair aerobic exercise and core strengthening exercise in reducing symptoms and severity of intensity of dysmenorrhea (MOOS, Questionnaire, WaLLID Score) and quality of life (SF-36) in adult girls. According to our result it has been proven that the chair aerobic exercise is significantly helped in improving the quality of life as well as reducing the symptoms of dysmenorrhea. Furthermore, the strengthening exercise has only proven to be effective in reducing the severity of symptoms but has negligible effect on improvement of quality of life.

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### Abbreviation

SF-36: Short Form survey-36; PF: Physical Functioning; SF: Social Functioning; MH: Mental Health; CH: Change in Health; RLP: Role Limitation due to Physical health; RLM: Role Limitation due to Mental health; EV: Energy Vitality

### Introduction

Dysmenorrhea is the medical term for pain with menstruation [1]. Dysmenorrhea is obtained from Greek word “dyes” (difficult, painful, abnormal), “meno” (month) and “rrhea” (flow) [2]. Dysmenorrhea not only affects the quality of life in females as well as their mental health which is responsible for loss of work hours and economic loss [1,3].

There are two types Dysmenorrhea of: Primary and secondary. Primary dysmenorrhea is common menstrual cramps that are recurrent accompanied by nausea, vomiting, fatigue, and diarrhea and typically lasting from 12 h to 72 h [1]. The causes are excessive myometrial contractions, ischemia, and excessive prostaglandin production. Secondary dysmenorrhea is defined by dull ache which is associated with, infertility, menstrual disorder and dyspareunia. For which the identified causes were adenomyosis, fibroids endometriosis and PID [2].

The main cause for menstrual pain is ischemia. Uterine contractions are caused due to release of prostaglandins during menstruation. It has two main actions in uterus:

1. Spiral artery vasospasm: Leading to ischemic necroses which result into muscle spasm and cramps and shading of superficial layer of endometrium.
  2. Increase myometrial contractions: In Indian female population prevalence of dysmenorrhea is about 70.2% [4-6].

Function of pelvic and extra pelvic organ is improved by physical activities adjusting metabolism and increasing the blood circulation [7]. It was believed that the purpose of core strengthening is combining the concepts of lumbar stabilization and how instability causes pain and injury especially during primary dysmenorrhea [8]. The anatomical structure of lumbar spine is designed in such a way that it can take the force of the body [9].

If the lumbar spine is weak and is not at its best to handle functional stress then it may lead to pain throughout the abdomen, low backs and thighs. These are those main areas affected in females suffering from primary dysmenorrhea irrespective of stress do menstrual cycle; body is much more prepared to handle daily forces of normal biomechanics so there is need to strengthen these muscles with the help of core strengthening exercises [8-10]. Research has proved that the women performing regular, moderate aerobic exercise had less pain and behavioral changes than women who don't take part during menstruation [11]. Aerobic exercises increase the release of endorphins by the brain leading to rise in the pain threshold and help to increase blood circulation which leads to decrease in cramps [12]. Thus proving that exercise has an analgesic effect against pain in primary dysmenorrhea [11].

Chair aerobic exercise is a physical activity of low to high intensity performed while sitting on a chair and it depends on the aerobic energy generating process [13]. Findings of earlier studies show that physical activities improve the metabolism, blood circulation and effective in improving quality of life during dysmenorrhea there is limited research to show any significant impact of core strengthening exercises and chair aerobic exercises along with education in primary dysmenorrhea.

## **Methodology Procedure**

Hundred girls were select fulfilling inclusion and exclusion criteria. A written consent form obtains from all 100 subjects who had primary dysmenorrhea. After that we will Wallid Score, Moos' questionnaires, SF-36 was note before and after intervention.

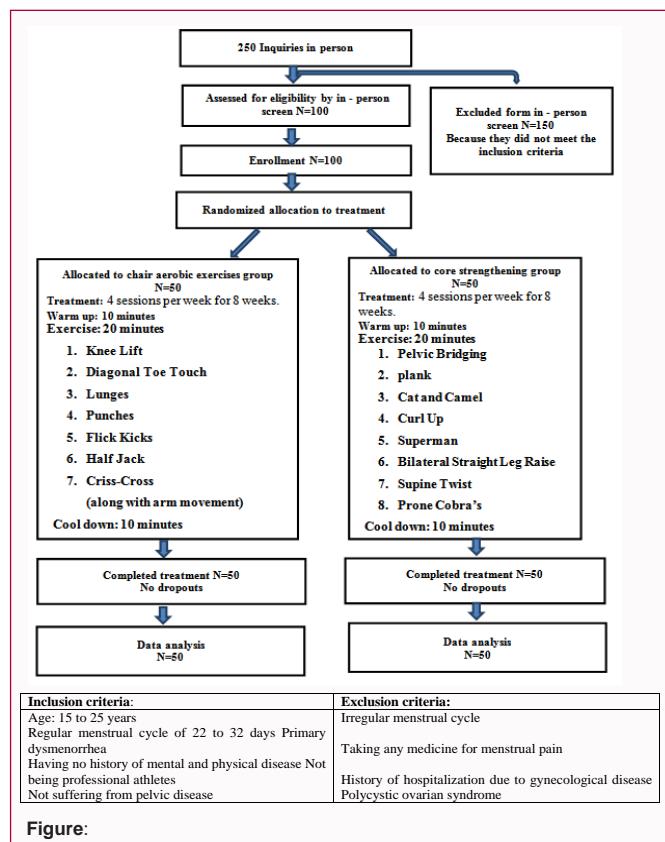
## **Intervention procedures**

The Study consists of 100 girls who had primary Dysmenorrhoea and divided into 2 groups. One group had received aerobic exercise and other had received core strengthening exercise along with prior education.

Education given in both group and that following point consider:

1. To provide basic information about menstruation & dysmenorrhea [14].
  2. To educate about primary treatment considering guideline for dysmenorrhea [15].
  3. Information regarding menstrual hygiene [16].
  4. To give knowledge about physical activity & nutrition [17].
  5. To teach basic positions for pain relief [18].

Exercise session was 4 times a week for 8 consecutive weeks pre



and post data collected on 3<sup>rd</sup> day of menstruation.

## Statistical tests

This study was to analyze the comparison of chair aerobic *vs.* core strengthening exercise on primary dysmenorrhea and quality of life using Moos questionnaire, WALIDD Score and SF-36. Fifty subject taken in each group pre & post data were analyzed. Paired t-test was used to compare pre & post values of each group. Unpaired t-test was used to compare post value of both groups. Each calculated t value was compare to t-table value to test hypothesis at 0.05 (5%) level of significant. Data were analyzed with the help of using SPSS version 16 statistical tool.

Table 1 show Mean age chair aerobic was 21.4 with SD 2.02, and core strengthening was 22.8 With SD of 1.14 of years. Mean of MOOS QUESTIONNIRE in chair aerobic was 108.06 with SD of 13.75 and core strengthening was 108.06 with SD of 19.81. Mean of WALIDD Score in chair aerobic was 8.4 with SD of 2.13 and core strengthening 8.06 with SD of 1.48.

## **Chair aerobic**

Table 2 shows intra group comparison of pre data and post data value of MOOS and WALIDD in Chair aerobic. The pre data of MOOS QUESTIONNIRE Mean was 108.06 with SD 13.75 when it was compared with post Mean 89.6 with SD 12.70, the obtained p-value was <0.0001 and statistical significant found between pre data and post data in chair aerobic.

The pre data WaLLID score Mean was 8.4 with SD of 2.13 when it was compared with post Mean of 7.33 with SD of 2.05, the obtained p-value was <0.0001 and statistical significant difference was found pre and post data in chair aerobic.

**Table 1:** Baseline characteristics of data.

Based Line Characteristic			
Characteristics	Chair Aerobic	Core Strengthening	P Value
	Mean ± SD	Mean ± SD	
Age	21.4 ± 2.02	22.8 ± 1.14	1
Weight	48.4 ± 6.65	53.35 ± 7.51	0.4823
Height	155.06 ± 4.06	155.33 ± 4.51	1
BMI	20.16 ± 2.48	21.85 ± 3.04	0.6232
Moos Questionnaire	108.06 ± 13.75	108.06 ± 19.81	1
WaLLID Score	8.4 ± 2.13	8.06 ± 1.48	0.6232

Sf-36 Component			
Physical Function	66.66 ± 10.46	67.33 ± 14.45	0.8427
Social Function	51.4 ± 13.43	51.66 ± 16.27	0.9613
Mental Health	54.33 ± 11.87	56.46 ± 7.23	0.6122
Pain	50.93 ± 12.78	56.73 ± 11.28	0.1984
Change In Health	53.66 ± 8.75	51.66 ± 6.45	0.4823
Role Limitation Physical	30 ± 33.16	28.33 ± 8.13	0.8854
Role Limitation Mental	17.73 ± 30.51	33.23 ± 35.68	0.0001
Energy Vitality	47 ± 8.19	50.33 ± 6.67	0.1294
Health Perception	51 ± 14.04	48.66 ± 13.15	0.0001

**Table 2:** Comparison of Moos Questionnaire and WALIDD Measurements.

Outcome	Group	Pre Mean ± SD	Post Mean ± SD	T Value	P Value
Moos Questionnaire	Chair Aerobic	108.06 ± 13.75	89.6 ± 12.7	6.79	<0.000 <sup>*</sup>
	Core Strengthening	108.06 ± 19.81	67.8 ± 10.37	8.74	<0.000 <sup>*</sup>
WaLLID Score	Chair Aerobic	8.4 ± 2.13	7.33 ± 2.05	6.95	<0.000 <sup>*</sup>
	Core Strengthening	8.06 ± 1.48	5.06 ± 0.7	8.87	<0.0001 <sup>*</sup>

**Table 3:** Comparison of pre and post value of SF-36.

Group	Sf-36 Component	Pre Mean ± SD	Post Mean ± SD	T Value	P Value
Chair Aerobic	Pf	66.66 ± 10.46	78.66 ± 8.33	3.67	0.0025
	Sf	51.4 ± 13.43	72.73 ± 15.74	4.22	0.0008
	Mh	54.33 ± 11.87	76.26 ± 9.25	5.58	<0.0001 <sup>*</sup>
	Pain	50.93 ± 12.78	80.66 ± 13.7	6.07	<0.0001 <sup>*</sup>
	Ch	53.66 ± 8.75	73.33 ± 14.84	5.46	<0.0001 <sup>*</sup>
	Rlp	30 ± 33.16	73.33 ± 24.02	4.13	0.001 <sup>*</sup>
	Rlm	17.73 ± 30.51	84.53 ± 27.73	7.75	<0.0001 <sup>*</sup>
	Ev	47 ± 8.19	55 ± 9.12	2.28	0.0125
	Hp	51 ± 14.04	69.33 ± 12.22	3.8	0.0019
Core Strengthening	Pf	67.33 ± 14.45	70.73 ± 14.45	0.6	0.55
	Sf	51.66 ± 16.27	64.13 ± 8.96	2.94	0.01
	Mh	56.46 ± 7.23	68.13 ± 6.06	7.07	<0.0001 <sup>*</sup>
	Pain	56.73 ± 11.28	65.33 ± 7.59	3.73	0.0022
	Ch	51.66 ± 6.45	59 ± 11.98	2.5	0.025
	Rlp	28.33 ± 28.13	60.33 ± 25.7	6.27	<0.0001 <sup>*</sup>
	Rlm	33.23 ± 35.68	64.66 ± 26.81	5.22	0.0001 <sup>*</sup>
	Ev	50.33 ± 6.67	56 ± 6.03	4.32	0.0006
	Hp	48.66 ± 13.15	57.33 ± 9.61	3.59	0.003

### Core strengthening

Table 2 shows the intra group comparison of pre data and post

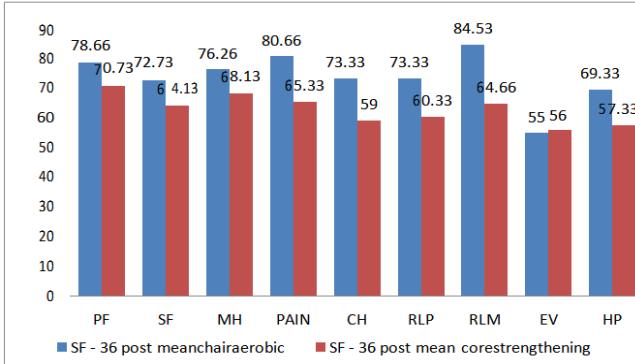
data value of MOOS and WaLIDD in core strengthening. The pre data MOOS QUESTIONNIRE Mean was 108.06 with SD of 19.81

**Table 4:** Comparison of outcome measures of post data between chair aerobic and core strengthening.

Outcome group	Group	Post Mean ± SD	T Value	P Value
Moos Questionnaire	Chair Aerobic	89.6 ± 12.7	5.13	<0.0001 *
	Core Strengthening	67.86 ± 10.37		
'WaLLID Score	Chair Aerobic	7.33 ± 2.05	4.03	0.0004 *
	Core Strengthening	5.06 ± 0.7		

**Table 5:** Comparison of post data of SF-36 between the groups.

Sf-36 Component	Chair Aerobic Post Mean ± SD	Core Strengthening Post Mean ± SD	T Value	P Value
Pf	78.66 ± 8.33	70.73 ± 14.45	1.46	0.154
Sf	72.73 ± 15.74	64.13 ± 8.96	1.83	0.0766
Mh	76.26 ± 9.25	68.13 ± 6.06	2.84	0.0082
Pain	80.66 ± 13.7	65.33 ± 7.59	3.78	0.0007
Ch	73.33 ± 14.84	59 ± 11.98	2.91	0.007
Rlp	73.33 ± 24.02	60.33 ± 25.7	1.4	0.1699
Rlm	84.53 ± 27.73	64.66 ± 26.81	1.99	0.0559
Ev	55 ± 9.12	56 ± 6.03	0.34	0.7324
Hp	69.33 ± 12.22	57.33 ± 9.61	2.98	0.0058



when it was compare with post mean 67.86 with SD of 10.37, the obtained p-value of <0.0001 and statistical significant found between pre data and post data in core strengthening.

The pre data WALIDD score Mean was 8.06 with SD of 1.48 when it was compared with post Mean of 5.06 with SD of 0.70, the obtained p-value was <0.0001 and statistical significant difference was found pre and post data in core strengthening.

### Chair aerobic

Table 3 shows intra group comparison of pre and post value of components of SF-36. Statistical significant difference was found in all components of SF-36 obtained p-value <0.0001.

### Core strengthening

Table 3 shows intra group comparison of pre and post value of components of SF-36. Statistical significant difference was found in all components except physical function component. Obtained p-value 0.0001. In physical function component obtained p-value was 0.55.

Table 4 shows inter group comparison of post data between the groups. In chair aerobic post data value of MOOS QUESTIONNIRE WITH Mean of 89.6 with SD 12.70; when it was compared with core strengthening value of MOOS with Mean of 67.86 with SD of 10.37, the obtained p- value <0.0001 and statistical significant difference was

found in post data measurement between groups.

Table 4 shows inter group comparison of post data between the groups. In chair aerobic post data value of WaLLID WITH Mean of 7.33 with SD 2.05; when it was compared with core strengthening value of WaLLID with Mean of 5.06 with SD of 0.70, the obtained p-value 0.0004 and statistical significant difference was found in post data measurement between group.

Table 5 shows comparison of post data of SF-36 between the groups. In that, the statistical significant difference found in mental health, pain, health change and health perception. In chair aerobic mental health post means 76.26 with SD of 9.25 is greater than core strengthening mental health post mean 68.13 with SD of 6.06. Then, in chair aerobic pain post mean 80.66 with SD of 13.7 is greater than core strengthening pain post mean 65.33 with SD of 7.59. Then, in chair aerobic health change post mean 73.33 with SD of 14.84 is greater than core strengthening post mean 59 with SD of 11.98. And chair aerobic health perception post mean with SD of 12.22 is greater than core strengthening post mean 57.33 with SD of 9.61. There is no significant differences found in physical and social functioning, role limitations due to physical health, role limitation due to mental health and energy vitality.

## Discussion

Dysmenorrhea is a severe painful cramping sensation in lower abdomen. It is characterized by lower abdominal pain that may radiate to lower back, upper thighs and it is associated with nausea, headache, fatigue, diarrhea, anxiety, depression, dizziness, irritability, mood swings, being over sensitive. Physical exercises have been recommended as non-pharmacological approach, to management of these symptoms. It appears that exercise have analgesic effect that acts is a non-specific way. Exercise stimulates production of endorphins, which act as a body natural pain killer [19,20]. The present 8 week study was done through chair aerobic exercise vs. core strengthening exercise on dysmenorrhea and quality of life in adolescent and young adult girls.

A comparative study on effect of chair aerobic exercises versus effect of core strengthening exercises with education on primary dysmenorrhea in adolescent girls was conducted to see the effect of exercise on relieving symptoms, severity, improve quality of life, and compare both treatment protocol (chair aerobic and core strengthening).

An experimental approach was chosen for conducting the study with pre test and post test design which was experimental in nature. Random sampling was used for selecting sample of n=100. In the following 8 week intervention, both group shows significant improvement in MOOS's and WALIDD score. The result shows in chair aerobic great decrease in MOOS's post test mean (89.6) than pre test mean (108.06) and in also core strengthening decreases in moon's post test mean (67.86) than pre test mean (108.06).

Then, there is chair aerobic exercise decrease in WALIDD post test mean (7.33) than pre test mean (8.4) and core strengthen exercise also decrease post test mean (8.06) than pre test mean (5.06). While comparing MOOS questionnaire for chair aerobic post mean (89.6) and core strengthening post mean (67.86) there is statistical significance difference between two groups. While comparing WALIDD score of Chair aerobic post mean (7.33) and core strengthening post mean (5.06) there is statistical significant difference between two groups.

There was compare pre mean and post mean of all components for SF-36 in both groups. In that, SF-36 all components found significant difference after exercise on both the groups accepts physical functions in core strengthening group.

While comparing post mean of SF-36 of both groups, statistically significant difference was found in components of pain, mental health, general health and health perception. There are no significant differences found in physical and social functioning, role limitations due to physical health, role limitation due to mental health and energy vitality.

An explanation for why some component of SF-36 was statistically significant because there was found in relation between that primary dysmenorrhea and exercise is involvement of stress is consider as main factor related to pain, mental health, general health perception. When inhibits stress leads to pulsatile release to follicle stimulating hormone and luteinizing hormone so to impaired follicular development could potential reduce progesterone synthesis and release. Stress increase sympathetic activity leads to increase menstrual pain and uterine contraction. Exercises through relieving stress may decrease sympathetic activity and their alleviating

symptoms [21]. Aerobic exercise is increases level of circulating endorphin which in turn raise pain threshold. Possible mechanism is the effect of exercise on blood leptin levels in girls with dysmenorrhea. Leptin is hormone secreted from fat cells and regulates metabolism of hypothalamus pituitary and gonadal has an important role in human reproduction [22]. Some researcher showed that aerobic reduces the amount of leptin in blood 30% to 34%. Hood and Dincher research according suggested that exercise reduce pain during menstruation by relaxing abdominal muscle and relieves pressure on nerve center, pelvic organ and decrease pelvic congestion.

In present study chair aerobic exercise show benefits like reduction in pain, stress, dizziness, depression, irritability. Aerobics act as anti analgesic and can cause decreasing primary dysmenorrhea. Also decreasing number of location of pain, days of pain, intensity of pain and increases in walking ability and also cardiovascular status, increases bone mineral content, improve dysmenorrhea and make physical activity improve by exercises.

Core strengthening work on lumbar spine in the form of muscular control and maintain functional stability and also strengthens the musculature which improved performance [23].

The implication of present study can be important in designing a treatment protocol with education for adolescent girls with primary dysmenorrhea and help quality of life.

## Conclusion

The study concludes that the effect of 8 weeks program of chair aerobic exercises and core strengthening exercise reduce the severity of the symptoms of dysmenorrhea.

The present study provide evidence to support to the use of both chair aerobic exercise and core strengthening exercise in reducing symptoms and severity of intensity of dysmenorrhea (MOOS' Questionnaire, Wallid Score) and quality of life (SF-36) in adult girls.

According to our result it has been proven that the chair aerobic exercise is significantly helped in improving the quality of life as well as reducing the symptoms of dysmenorrhea. Furthermore, the strengthening exercise has only proven to be effective in reducing the severity of symptoms but has negligible effect on improvement of quality of life.

## Limitation of Study

This study has not included the socio-economic status and cultural beliefs regarding menstruation, which this may vary from different ethnicity and may lead to variation in participation of physical exercises. This study did not include feedback of each participants post exercises sessions. This study excluded elite athletes but it did not segregate the different levels of physical activity. It was conducted only for adult girls. How education reduced symptoms and sings of dysmenorrhea and also improve quality of life in adult girls which is not known because here education were given both the group.

## Clinical Implication

For clinically both the exercises use to benefits of primary dysmenorrhea. Thus the alternate exercise session was beneficial to reducing sing and symptoms of primary dysmenorrhea, improve ability to work and also reduce prevalence of absentees in adult girls.

## Future Recommendation

The study should be done with large sample size.

Long term effect of chair aerobic and stretching exercise should be checked. It can be done on any other menstruation group. It can be done by comparing different age group. The study can be extended with inclusion and comparison subjective measures of physical activity for participants.

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