



Full Length Research Paper

The impact of heat application versus stretching and core strengthening exercises on relieving pain of primary dysmenorrhea among young females

^{1,3}Hayam Fathey A. Eittah* and Eman Seif S. Ashour²

¹Assistant Professor of Maternal and Newborn Health Nursing Faculty of Nursing -Menoufia University

²Lecturer of Maternal and Newborn Health Nursing Faculty of Nursing, Menoufia University

³Associate professor of Maternal and Newborn Health Nursing, Maternity and childhood department, Nursing College Taibah University, Madinah, KSA

*Corresponding Author's Email: hayameittah@yahoo.com

ABSTRACT

Primary dysmenorrhoea is considered the most common gynaecologic disorder among young females. Primary dysmenorrhea is defined as painful and difficult menstrual flow in the absence of any pelvic disorders. The study was carried out to examine the effect of heat application on relieving pain of primary dysmenorrhea, examine the effect of stretching and core strengthening exercises on relieving pain of primary dysmenorrhea, compare between heat application and stretching and core strengthening exercises on relieving pain of primary dysmenorrhea among young females. Quasi experimental design (randomized controlled trial design) was used to conduct this study. The subjects included in the study were between 18-25 years with primary dysmenorrhea selected from female girls at faculty of Nursing, Menoufia University. Three tools were used in this study; tool one: interviewing questionnaire which include; socio-demographic data, menstrual history. Tool two; assessment of dysmenorrheal symptoms. Tool three; the numeric pain rating scale (NRS) assessing pain of dysmenorrhea before and after intervention. Simple random sample was used to select the participants of this study, total sample was 150 females. There was no statistical significance difference between the three studied groups regarding pain scores before intervention but there was a highly statistical significance difference between them after intervention (after use in the same menstrual cycle, second cycle and after third cycle ($p < 0.001^{**}$, $< 0.001^{**}$ and $< 0.001^{**}$) respectively. Stretching and core strengthening exercises (Group B) was more effective in reducing pain of dysmenorrhea as compared with heat application (Group A). Heat application and stretching and core strengthening exercises help in decreasing the intensity of pain of dysmenorrhea in group A and B than group C (control group). Stretching and core strengthening exercises was more effective in reducing pain of dysmenorrhea than heat application. Health education of young female girls about the importance of the use of heat application and physical exercises to relieve pain of primary dysmenorrheal is recommended.

Keywords: Menstrual cycle, primary dysmenorrhea, pain score, heat application, stretching and core strengthening exercises.

INTRODUCTION

Primary dysmenorrhea is not a real threat of life, but it can affect the quality of female life. It can cause psychological problems in some of the females leading to their loneliness and inactive participation in various social activities (Mansoureh et al., 2015). In many countries, primary dysmenorrhea is the main reason for recurrent

short-term school and work absenteeism in young girls and women. Data from a few numbers of longitudinal studies have shown that the absenteeism from school due to primary dysmenorrhea is 34-50%. In fact, as documented by several studies, there is a great cost to both the individuals and society as a result of

dysmenorrhea (Khan et al., 2012).

Most teenagers and young females experience cramping lower abdominal pain usually concentrated in the pubic area and may radiate to the back of the legs or the lower back due to primary dysmenorrhea (Latthe et al., 2011). However, some women have one or more of the wide range of symptoms as nausea, vomiting, diarrhea, fatigue, mild fever, nervousness, mood swings and headache (Ann and Zigang, 2011).

Adolescent girl is considered to have primary dysmenorrhea if there is no diagnosable pelvic pathology and tends to occur within 12 months of menarche (Daley, 2009). The pain of menstruation normally evolves within hours of the start of menstruation and peaks as the flow becomes heavier for the first 24 hours but may persist for 2 days. The most popular impact of primary dysmenorrhea on the quality of life, reported by adolescent girls was in the form of rest hours for long periods followed by inability to study (Chantler et al., 2008; Rima Gupta et al., 2013).

It is believed that symptoms of primary dysmenorrhea stem from increased concentrations of prostaglandins F₂" (PGF₂") resulting in uterine contractions and ischemia. One possible mechanism for increasing prostaglandins is that, during the premenstrual phase, progesterone declines leading to the synthesis of prostaglandins in endometrial cells by membrane phospholipids. This process is supported by the ability of prostaglandin synthesis inhibitors in pain relief, as these inhibitors only provide pain relief in 70% to 75% of women (Ortiz et al., 2009; Hong-Gui and Zheng-Wei, 2010).

Different treatments including pharmacological and non-pharmacological treatment such as taking non-steroidal anti-inflammatory drugs (NSAIDs), herbal, dietary therapies, yoga, meditation, transcutaneous electrical nerve stimulation (TENS), acupressure, acupuncture, bed rest, massage therapy, exercise and application of heat packs have been used to alleviate the effects of dysmenorrhea (Davis and Westhoff, 2001; Fugh-Berman and Kronenberg, 2003). Stretching or core strengthening exercises and heat application are widely accepted as a means of moderating stress and stress-related symptoms. Exercise is known to cause the release of endorphins hormones in brain that raise the pain threshold and is shown to improve mood of exercising subjects (Sharma and Gupta, 2003; Iorno et al., 2007; Shahrjerdi and Hoseini, 2010). However, because of high prevalence of primary dysmenorrhea in different societies and the potential benefits of exercise found in treating dysmenorrhea and also existence of few studies which claimed that physical activity has no effect on primary dysmenorrhea (Blakey et al., 2010).

In the past two decades, the relationship between Physical activity, application of heat and menstrual disorders including primary dysmenorrhea has significantly been studied. Researches results have indicated that physical activity and the application of heat

can affect menstruation in many ways including reduce the symptoms of premenstrual syndrome and dysmenorrhea (Khan et al., 2012).

Physical exercise is also an important assistant behavioral factor, people who identify themselves as active had lower levels of inflammatory biomarkers than their sedentary peers (Daley, 2008). Physical exercise can be defined as an activity that requires physical exertion, especially when carried out to develop or maintain fitness (Rumball and Lebrun, 2004). It has been suggested that exercises as a non-medical method for the management of symptoms. The notion that a different type of active or passive exercises may help in alleviating pain in primary dysmenorrhea is not a new issue. It is widely believed that exercise reduces the frequency and the intensity of dysmenorrheal syndrome (Ann and Zigang, 2011).

Research in the general population has demonstrated that women who participated in regular, moderate exercise had less pain and behavioral changes, than non-exercisers during period cycles. That reduction of dysmenorrhea may be due to impacts of hormonal changes on uterine epithelial tissues or an increase in endorphin levels. It seems that exercise has analgesic implications that operate in a non-specific manner (Daley, 2008).

Core strengthening exercises will allow small intrinsic muscles around the lumbar spine to be conditioned to increase performance; this training allows the isolation and strengthening of core muscle groups. When these muscles are strong, they are much more ready to deal with daily stresses of natural biomechanics, even when the body is under the tension of the monthly cycle. Core strengthening is a description of the muscular control around the thoracic spine to keep the function stability (Kaur et al., 2014).

After reviewing the available body of literature, it is clearly noticed that lots of young females suffer from menstrual disorders including primary dysmenorrhea which directly decrease their quality of life. It affects about 60% to 93% of adolescent girls all over the world. Stretching or core strengthening exercises and heat application are widely accepted as a means of moderating stress and stress-related symptoms. However, because of high prevalence of primary dysmenorrhea in different societies and the potential benefits of exercise found in treating dysmenorrhea and also existence of few studies which claimed that physical activity has no effect on primary dysmenorrhea. Thus the purpose of this piece of work was to study the impact of heat application versus stretching and core strengthening exercises on relieving pain of primary dysmenorrhea among young females as a non-pharmacological intervention.

Purpose of the study

The purpose of this study was three folds:

- 1- Examine the effect of heat application on relieving dysmenorrheal pain.
- 2- Examine the effect of stretching and core strengthening exercises on relieving dysmenorrheal pain.
- 3- Compare between heat application, stretching and core strengthening exercises on relieving pain of primary dysmenorrhea among young females.

Hypotheses

- 1- The girls who use heat application will have less pain of primary dysmenorrhea, than those who do not.
- 2- The girls who use stretching and core strengthening exercises will have less pain of primary dysmenorrhea, than those who do not.
- 3- Stretching and core strengthening exercises are more effective on relieving pain of primary dysmenorrhea than heat application.

METHODS

Research design

Quasi experimental design (Randomized Controlled Trial) was utilized to conduct this study

Sampling

Simple Random Sampling technique (SRS) was used to select the participants. About 150 female girls were recruited in this study; the participants were randomly divided into 3 groups, (2 intervention groups A, B and control group (C) each group contained 50 female girls. The sampling technique was simple random which achieved by asking each girl to pick piece of folded paper. The paper carry letter (A) means this heat application group, the paper carry the letter (B) means stretching and core strengthening exercises group and the paper which was carry the letter (C) means a control group which left for routine care of menstrual cycle.

Inclusion criteria

1. Single female girls.
2. Suffering from primary dysmenorrhea.
3. Free from any gynecologic disorders.
4. Accepting to participate in the study.
5. Didn't use drugs for pain relief during the study.
6. Pain intensity of 5 or above in numeric pain rating scale (N R S)
7. Have regular menstruation.

Tools

The tools used in this study were three tools; tool one; interviewing questionnaire which contained socio-demographic data, personal history and menstrual

history, tool two; assessment of sample symptoms of primary dysmenorrhea, tool three; the numeric pain rating scale (NRS) to assess pain score of dysmenorrhea before and after intervention. Which is valid reliable and proven in different studies as a measure of pain intensity. The numeric pain rating scale (NRS) is a 10 points scale on which, zero represent no pain, 1 to 3 represent mild pain, 4 to 7 represent moderate and pain score between 7 and 10 were considered to be a severe form of pain. tool one and tool two developed by the researchers after reviewing pertinent review, tool three was adopted from text books and scientific journals all tools revised and evaluated by 5 experts in maternal and newborn health nursing department in faculty of Nursing, Menoufia University.

Validity and reliability

For validity purposes the researcher conducted an extensive literature review and developed the questionnaire from previously used tools and reviewing pertinent review. The questionnaire was formulated and cross-checked for its content validity by a group of experts in maternal and newborn health nursing department in faculty of Nursing, Menoufia University. (content validity). The required modification was carried out accordingly. Test-retest reliability was used for estimating the reliability.

Pilot study

The questionnaire applied to 10% of the sample (15 girls). Pilot study was conducted to assess applicability clarity and simplicity of the tools and the maneuvers of the interventions, and to estimate the time needed. Based on its results, the final versions of the tools were prepared. It also helped in planning the schedule for field work. The sample of the pilot study was excluded from the main study sample as some changes were done in the data collection instruments based on the findings of the pilot study.

Ethical consideration

Permission to conduct the study was obtained from high authority of nursing college. Verbal consent was obtained from each participant to be involved. The researchers were offered adequate information about the study purposes and its significance. Participation was voluntary. Participants were assured that their responses would be confidential and information that might reveal their identity would not be recorded, and only aggregated data would be communicated.

Procedure

This Randomized controlled study was performed from April 2016 through August 2016. Subjects included in the

study were between 18-25 years with primary dysmenorrhea selected from female girls at faculty of Nursing, Menoufia University. The samples were assigned to an intervention groups (A and B) and a control group (C) by permuted block randomization. All participants experienced moderate to severe symptoms of dysmenorrhea. All subjects participated in an introductory session. The researchers explained the purposes of the study to the sample and told them that; sharing in the study was voluntary, any data given was confidential and used only for research purpose and any participant can be withdrawn at any time from the study without giving rational.

Thereafter, all subjects completed the different parts of questionnaire. In the first part of the questionnaire, demographic characteristics regarding age and mass body index were assessed. In the second part of the questionnaire, menstrual history and menstrual characteristics including volume (quality and quantity), amount of bleeding, onset of menstruation and length of menstruation were assessed. In the third part, female girls were asked to quantify pain intensity by numerical rating pain score (NRS).

As the participants were randomly divided into 3 groups, (2 intervention groups (A, B) and control group C); each group contained 50 female girls. The intervention applied to group A and B (heat application for group A, stretching and core strengthening exercises for group B) and third group (C) left for routine care used by female girls to relieve the pain of dysmenorrhea. The interviewing questionnaire take 5 minutes to be filled, the warm compress was applied to the lower abdomen and/or lower back in the form of hot water bottle, bag or traditional application of warm material soaked in warm water at the days of menses. It is important to avoid burning the skin with a heating pad or hot water bottle that is too hot; a temperature of approximately 104°F (40°C) is recommended.

The heat can be applied as often as it is needed. While physical exercises practiced before the days of menses. Active stretching and core strengthening exercises was practiced (4 days per week, 2 times a day, and 10 min) at home. The researchers gave training to the samples about performing active stretching and core strengthening exercises and gave them booklet about it which illustrated by pictures. All the subjects were examined for pain intensity using NRS (10-point scale) in the first session (1st menstruation), the reassessed in second and third cycle.

Data analysis

Data were entered into SPSS statistical software (v. 20) and analyzed using independent t-test, repeated measures ANOVA, Mean and Bonferroni Post hoc test. Besides, $P < 0.05$ was considered statistically significant.

RESULTS

Table 1 represents the socio-demographic characteristics of the sample; the study carried out on 150 females who divided into three groups (two groups are intervention groups and one group is a control group) each group from the three groups count 50 females; The range of age of total sample was from 18-25 years and all of them are single. Regarding to menstrual history; the age of menarche of the majority of samples were from 10 to <16 years. The highest percent of the sample (96.7%) has regular menses. About 96% of the sample has duration of the menses from (4-6 days). The entire sample (100%) complains from dysmenorrhea.

Table 2 shows no statistical significance difference regarding comparison between the studied groups as regards to height, weight, and BMI. Regarding to the height of sample more than half of the sample (52%) was (145 – 160 cm). As shown in the table 2 the majority of the sample (88.7%) has normal body mass index (BMI) (18.5 -24.9) according to WHO classification of BMI.

As displayed by table three there is no statistical significance difference regarding age of menarche, regularity of menstruation, interval of menstruation, and duration of menstruation in the three studied groups. The majority of the sample's age of menarche (98.0%, 96.0%, and 96.7%) was 10 to < 16 in groups A, B, and C respectively. The highest percent of the sample (96.7%) have regular menses. Regarding to the interval of menstruation was 30 to < 35 days in highest percent of the sample and the duration was from 4 to 6 days in the majority of studied samples.

Table 4 shows the symptoms associated with dysmenorrhea. There were a statistical significance difference regarding headache and diarrhea ($p = < 0.01^{**}$), but there were no statistical significance difference regarding other symptoms.

Table 5 displays the comparison between the studied three groups regarding to pain scores. There is no statistical significance difference between the three studied groups before intervention but there is a highly statistical significance difference after intervention (after use in the first menstrual cycle, the second cycle and after the third cycle ($p = < 0.001^{**}$, $< 0.001^{**}$ and $< 0.001^{**}$) respectively.

Table 6 shows the pain scores comparison between the two intervention groups, great improvement in the pain scores after intervention in the first cycle, the second cycle, and the third one than before intervention and there is a highly statistical significance difference ($p = < 0.01^{**}$, $< 0.001^{**}$). As shown in the table the improvement was greater in exercise group than heat application group, the mean of pain scores before intervention, in the first cycle, second cycle and third cycle were (7.34, 6.37, 5.43 and 4.56), in group A, compared to (7.34, 6.06, 4.92, and 4.25) in group B respectively.

Table 1: Socio - Demographic Characteristics of the Studied Samples and the Menstrual History (No. =150)

Variables		Frequency (number)	Percent (%)
Groups of the study	Group A	50	33.3
	Group B	50	33.3
	Group C	50	33.3
Age (years)	18 - 25 years	150	100.0
Academic year	Third year	150	100.0
Marital Status	Single	150	100.0
Age of menarche (years)	10 - < 16 years	145	96.7
	16 - < 18 years	5	3.3
Regularity of menstruation	Regular	145	96.7
	Irregular	5	3.3
Interval of menstruation (days)	21 - < 25 days	2	1.3
	25 - < 30 days	144	96.0
	30 - < 35 days	4	2.7
Duration of menstruation(days)	2-3 days	2	1.3
	4-6 days	144	96.0
	7 - 10 days	4	2.7
Do you complain from menstrual pain	Yes	150	100.0

Table 2: Comparison between the Studied Groups as Regards to Height, Weight, and BMI (n=150)

Variables	Groups of the study			Total	χ ²	P value	
	Group A (50)	Group B (50)	Group C (50)				
Height (cm)	> 145 cm	Number	5	5	5	0.18	>0.05
		%	10.0%	10.0%	10.0%		
	145 – 160 cm	Number	27	26	25	78	
		%	54.0%	52.0%	50.0%	52.0%	
161 – 181 cm	Number	18	19	20	57		
	%	36.0%	38.0%	40.0%	38.0%		
Weight (kg)	< 50 Kg	Number	1	2	0	2.34	>0.05
		%	2.0%	4.0%	0.0%		
	51 – 70 Kg	Number	28	29	31	88	
		%	56.0%	58.0%	62.0%	58.7%	
	71 – 90 Kg	Number	16	14	14	44	
		%	32.0%	28.0%	28.0%	29.3%	
	> 90 Kg	Number	5	5	5	15	
		%	10.0%	10.0%	10.0%	10.0%	
BMI	<18.5	Number	1	2	0	2.20	>0.05
		%	2.0%	4.0%	0.0%		
	18.5 -24.9	Number	45	43	45	133	
		%	90.0%	86.0%	90.0%	88.7%	
	25- 29.9	Number	4	5	5	14	
		%	8.0%	10.0%	10.0%	9.3%	

Table 3: Comparison Between The Studied Groups As Regards to Age Of Menarche, Regularity Of Menstruation, Interval Of Menstruation and Duration of menstruation (n=150)

Variables		Groups of the study			Total	χ^2	P value	
		Group A(50)	Group B(50)	Group C(50)				
Age of menarche	10 - < 16 years	Number	49	48	48	145	0.41	>0.05
		%	98.0%	96.0%	96.0%			
	16 - < 18 years	Number	1	2	2	5		
		%	2.0%	4.0%	4.0%			
Regularity of menstruation	Regular	Number	47	49	49	145	1.65	>0.05
		%	94.0%	98.0%	98.0%			
	Irregular	Number	3	1	1	5		
		%	6.0%	2.0%	2.0%			
Interval of menstruation (days)	21 - < 25 days	Number	1	0	1	2	1.54	>0.05
		%	2.0%	0.0%	2.0%			
	25 - < 30 days	Number	47	49	48	144		
		%	94.0%	98.0%	96.0%			
	30 - < 35 days	Number	2	1	1	4		
		%	4.0%	2.0%	2.0%			
Duration of menstruation (days)	2-3 days	Number	1	1	0	2	4.54	>0.05
		%	2.0%	2.0%	0.0%			
	4-6 days	Number	48	49	47	144		
		%	96.0%	98.0%	94.0%			
	7 - 10 days	Number	1	0	3	4		
		%	2.0%	0.0%	6.0%			

Table 4: Comparison between The Studied groups regarding to symptoms of the Dysmenorrhea. (n=150)

Variables		Groups of the study			Total	χ^2	P value
		Group A (50)	Group B (50)	Group C (50)			
Leg pain	Number	40	39	39	119	0.08	>0.05
	%	33.6%	32.8%	32.8%	79.3%		
Lumber pain	Number	40	39	39	119	0.08	>0.05
	%	33.6%	32.8%	32.8%	79.3%		
Abdominal pain	Number	40	39	39	119	0.08	>0.05
	%	33.6%	32.8%	32.8%	79.3%		
Sharp intermittent spasm of the suprapubic area	Number	40	42	42	123	0.27	>0.05
	%	32.5%	34.1%	34.1%	82.0%		
Headache	Number	50	44	44	144	12.50	<0.01**
	%	34.7%	30.6%	30.6%	96.0%		
Fatigue	Number	50	50	50	150	-----	-----
	%	33.3%	33.3%	33.3%	100.0%		
Nausea	Number	40	39	37	116	0.53	>0.05
	%	34.5%	33.6%	31.9%	77.3%		
Vomiting	Number	40	39	33	112	3.03	>0.05
	%	35.7%	34.8%	29.5%	74.7%		
Diarrhea	Number	50	50	44	144	12.50	<0.01**
	%	34.7%	34.7%	30.6%	96.0%		
Shivering and muscle cramps	Number	40	40	41	121	0.08	>0.05
	%	33.1%	33.1%	33.9%	80.7%		

Table 5: Comparison between the three Studied Groups as Regards to Pain Scores. (n=150)

Variables		N	Mean	SE	ANOVA	P value	Post Hoc test
Degree of pain before intervention	Control	50	7.38	.37	0.015	>0.05	-----
	Group A	50	7.30	.37			
	Group B	50	7.30	.37			
Degree of pain after use in the same menstrual cycle	Control	50	7.18	.38	10.428	<0.001**	(A=B)<C
	Group A	50	5.56	.32			
	Group B	50	5.08	.30			
Degree of pain after one month (second cycle)	Control	50	7.04	.40	45.699	<0.001**	(A=B)<C
	Group A	50	3.82	.28			
	Group B	50	3.02	.23			
Degree of pain after 2 month (third cycle)	Control	50	6.82	.43	90.302	<0.001**	(A=B)<C
	Group A	50	2.30	.21			
	Group B	50	1.68	.15			

Table 6: Assessment of Pain Score at Different Times in the Intervention Groups (Heat Therapy and Exercise Groups) (n=100)

Variables	Degree of pain	Code	Mean	Std. Error SE	#ANOVA Repeated measures	P value	Bonferroni post Hoc test
Heat Application (group A)	before use	A	7.34	.26	34.34	<0.001*	D<C<B<A
	the same	B	6.37	.26			
	menstrual cycle after one month	C	5.43	.29			
	after 2 month	D	4.56	.33			
Exercise (group B)	before exercises	A	7.34	.26	30.87	<0.001*	D<C<B<A
	in same	B	6.06	.26			
	menstrual cycle after one month	C	4.92	.31			
	after two months	D	4.25	.34			

ANOVA (repeated measures) statistical test was used to assess the difference between means. While Bonferroni test was used to assess difference between each (two) means. Interpretation of Bonferroni test: </> (significant difference) = (non-significant difference)

DISCUSSION

Pain in general has disabling nature and makes dysmenorrhea stressful and it can become important irritating factor in the life of many women. Some women are completely prostrated and cramped to bed, whereas others are able to remain in the works with the support of analgesics. So, many studies were done to replace medications by physical exercises in the management of primary dysmenorrhea (Bill and Halvorson, 2010).

The present study was conducted to compare the impact of physical exercises versus heat application in relieving pain of primary dysmenorrhea and which protocol are better either exercises or heat application. As Regard to the socio-demographic characteristics of the sample; the current study revealed that the range of age of total sample is 18-25 years and all of them are single. The majority of the sample was has normal body mass index according to WHO classification of BMI. This finding is in line with (Noorbakhsh et al., 2012).

Regarding to the menstrual history; the age of menarche was from 10 to < 16 years in the majority of the sample. The highest percent of the sample has regular menses. This finding is in line with (Noorbakhsh et al., 2012). The entire sample of current study was complaining from dysmenorrhea. This finding is in line with (Noorbakhsh et al., 2012) who investigated the effect of physical activity on primary dysmenorrhea of female university students and stated that there were no significant differences in the demographic characteristics between subjects of the experimental and control groups. This minimized the effects of group differences that could affect outcome measures.

In the current study, the treated females reported a significant reduction in menstrual pain within an average of 8 weeks of exercises and heat application (Group A and Group B) as reported by NRS. Pain of primary dysmenorrhea has significantly reduced in both exercises and heat application groups than in control group as regard intensity and duration. Mean of pain in Group (A)

reduced from 5.65 to 3.82 (in 2nd cycle) then to 2.30 (3rd cycle) and in Group (B) from 5.08 to 3.02 (in 2nd cycle) then to 1.68 (3rd cycle) but in Group C the results were not significant.

The current study showed the heat application was effective method for relieving pain of primary dysmenorrhea. This finding was in the line of (Akin et al., 2004), who found that topical heat would decrease dysmenorrheal pain. Data gathered in this study showed heat application had results similar to physical exercise or other treatments such as using synthetic medicine, herbal medicine and that traditional remedies can be effective in decreasing dysmenorrhea.

As regard to the effect of stretching and core strengthening exercises the current study revealed great improvement in the pain scores of primary dysmenorrhea as it decreased to 1.68 in the third cycle. In the same line of this finding was (Daley, 2008) who found that after 12 weeks of aerobic training, the intensity of primary dysmenorrheal decreased, also (Usha and Madhavi, 2013) expressed that dysmenorrhea in girls who were involved in sports and physical activities were less than non-exercise group.

Furthermore these findings are similar to those of lots of authors who studied the effects of exercises on primary dysmenorrhea. Abbaspour et al., 2006 and Shahr-jerdy and Hosseini, 2012 proved that stretching exercises are effective in reducing pain intensity, pain duration, and the amount of painkillers used by girls with primary dysmenorrhea. Additionally, in the congruence of this study finding was (Onur, 2012) that studied the impact of home-based exercise on quality of life of women with primary dysmenorrhea and concluded that there is evidence that exercise has a positive effect in reduction of pain of dysmenorrhea.

This improvement may be due to the increase in the blood flow and metabolism of the uterus during exercise which may be effective in the reduction of dysmenorrheal symptoms. Stress tends to enhance sympathetic activity and may increase menstrual pain by exacerbating uterine contraction. Exercise may decrease this sympathetic activity and relief the stress through release of endorphins, substances produced by the brain that raise the pain threshold, so reducing symptoms (Mastrangelo et al., 2007; Dawood, 2006; Daley, 2009; Kaur et al., 2014; Latthe et al., 2011; Ju et al., 2014).

Regarding to comparing heat application to physical exercises in reducing pain scores. The current study revealed that; stretching and core strengthening exercises (Grp A) was effective in reducing pain of dysmenorrhea as compared with heat application (Grp B) this clearly observed in reduction in the mean of pain scoring in both groups in the same cycle, in the second cycle and in the third cycle respectively but the great improvement in pain scoring was observed in group B and this showed a statistical significant difference between the two intervention groups. This finding is

supported by previous studies carried out by Shavandi et al., 2009; Iorno et al., 2007 and Shahrjerdi and Hoseini, 2010. One likely mechanism for reducing the menstruation pain in post-exercise group is that physical activity may help a faster transfer of vast products and prostaglandins as a root of menstruation pain from uterine muscle. This result is not in agreement with (Kermanshahi et al., 2009) which might be due to age of subjects and training conditions.

In conclusion, the results of the present study suggested that performing stretching and core strengthening exercises and heat application reduced the primary dysmenorrhea symptoms including pain intensity and duration of primary dysmenorrhea. So these can be safely used as an alternative therapy for pain relief of dysmenorrhea. Therefore, because of high potential benefits of physical activity and exercise in reducing the detrimental effects of primary dysmenorrhea symptoms, young girls are recommended to take part in such exercise programs in order to help them to decrease the negative impact of these symptoms on their academic, social and even personal life.

CONCLUSION

Primary dysmenorrhea experienced entire sample of current study, heat application and physical exercises help in decreasing the intensity of pain of primary dysmenorrhea in group A and B than group C. There is evidence that stretching and core strengthening exercises has a positive effect in the treatment of primary dysmenorrhea in female girls. The current study revealed that; stretching and core strengthening exercises (Grp B) was effective in reducing pain of dysmenorrhea as compared with heat application (Grp A) this clearly observed in reduction in the mean of pain scoring in both groups in the same first cycle, second cycle and in the third cycle respectively but the great improvement in pain scoring was observed in group B.

RECOMMENDATIONS

- Health education of female girls about the importance of the use heat application and physical exercises to relieve pain of dysmenorrhea.
- Stretching and core strengthening exercises should be generalized as a remedy for relief of dysmenorrhea than using analgesics.
- Further studies using large sample size for generalization.
- Although further randomized controlled trials may be needed for potential positive effect in reducing a number of other symptoms and complaints that are often associated with primary dysmenorrhea.
- Physical exercises can be recommended for all affected girls.

REFERENCES

- Abbaspour Z, Rostami M, Najjar SH (2006). The effect of exercise on primary dysmenorrhea. *J. Res. Health Sci.* 6: 26-31.
- Akin M, Price W, Rodriguez G Jr, Erasala G, Hurley G, Smith RP (2004). Continuous, low-level, topical heat wraps therapy as compared to acetaminophen for primary dysmenorrhea. *J. Reprod. Med.* 49(9):739-745.
- Ann M Bode, Zigang Dong. (2011); *The amazing and mighty ginger, Herbal Medicine: Biomolecular and Clinical Aspects*, Second Edition, CRC Press, 131-46.
- Bill S, Halvorson R (2010). Core Stability for Enhanced Daily Function. *IDEA Fitness J.* 7: 25-58.
- Blakey H, Chisholm C, Dear F, Harris B, Hartwell R, Daley A, Jolly K (2010). Is exercise associated with primary dysmenorrhoea in young women? *BJOG: Int. J. Obstet. Gynecol.* 117: 222-224.
- Chantler I, Mitchell D, Fuller A (2008). The effect of three cyclooxygenase inhibitors on intensity of primary dysmenorrhoeic pain. *Clin. J. Pain.* 24: 39-44.
- Daley AJ (2009) The role of exercise in the treatment of menstrual disorders: the evidence. *Br. J. Gen. Pract.* 59: 241-242.
- Daley AJ (2008). Exercise and primary dysmenorrhea: a comprehensive and critical review of the literature, *Sports Med* 38: 659-670.
- Davis AR, Westhoff CL (2001). Primary dysmenorrhea in adolescent girls and treatment with oral contraceptives. *J. Pediatr. Adolesc. Gynecol.* 14(1): 3-8.
- Fugh-Berman A, Kronenberg F (2003). Complementary and alternative medicine (CAM) in reproductive-age women. A review of randomized controlled trials. *Reprod. Toxicol.* 17(2): 137-152.
- Hong-Gui Z, Zheng-Wei Y (2010). Students Group, Prevalence of dysmenorrhea in female students in a Chinese university: a prospective study. *Health*, 2(4): 311-314. <http://www.scirp.org/journal/HEALTH/>
- Iorno V, Burani R, Bianchini B, Minelli E, Martinelli F, Ciatto S (2007). Acupuncture treatment of dysmenorrhoea resistant to conventional medical treatment. *Creative Commons Attribution Non-Commercial License*, <http://creativecommons.org/licenses/by-nc/2.0/uk/>
- Ju H, Jones M, Mishra G (2014). The prevalence and risk factors of dysmenorrhea. *Epidemiol Rev* 36: 104-113.
- Kaur S, Kaur P, Shanmugam S, Kang MK (2014). To compare the effect of stretching and core strengthening exercises on primary dysmenorrhea in young females, *IOSR J. Dental and Med. Sci. (IOSR-JDMS)* 11: 22- 32.
- Kermanshahi S, Hosseinzadeh SH, Alhani F (2009). The effect of the group counseling program on the status of primary dysmenorrhea, dietary condition and exercise in Shahreyar girl's high school. *Zanjan Med. Uni. J.*, 16(65): 49-60.
- Khan KS, Champaneria R, Latthe PM. (2012); How effective are non-drug, non-surgical treatments for primary dysmenorrhoea? *BMJ*; 344:e3011 doi: 10.1136/bmj.e3011
- Latthe PM, Champaneria R, Khan KS (2011). Dysmenorrhoea, *BMJ Clin. Evid.* 2011.
- Mansoureh Hoseini, Sheida Rafieezadeh Gharah Tapeh, Azam Jahazi. (2015) effect of vibration and heat combination on primary dysmenorrhea, *Bali Medical Journal (Bali Med J)*, Volume 4, Number 1: 12-16
- Mastrangelo MA, Galantino ML, House L (2007). Effects of yoga on quality of life and flexibility in menopausal women: a case series. *Explore (NY)* 3: 42-45.
- Noorbakhsh M, Alijani E, Kohandel M, Mehdizadeh TZ, Mirfaizi M, Hojat S (2012). The effect of physical activity on primary dysmenorrhea of female university students, College of Physical Education and Sport Sciences, Islamic Azad University - Karaj Branch, Iran Department of Midwifery, Islamic Azad University - Karaj Branch, Iran. *World Appl. Sci. J.* 17 (10): 1246-1252.
- Onur O (2012). Impact of home-based exercise on quality of life of women with primary dysmenorrhea. *SAJOG* 18: 15-18.
- Ortiz MI, Rangel-Flores E, Carrillo-Alarcón LC, Veras-Godoy HA (2009). Prevalence and impact of primary dysmenorrhea among Mexican high school students. *Int. J. Gynaecol. Obstet.* 107(3): 240-3.
- Polit D, Hungler B (1997). *Essentials of nursing research: methods, appraisal, and utilization* (4th ed). J.B. Lippincott Company: Philadelphia, Pennsylvania, USA.
- Rima Gupta, Sukhwinder Kaur, Amarjeet Singh, (2013); Comparison to assess the effectiveness of active exercises and dietary ginger vs. active exercises on primary dysmenorrhea among adolescent girls, *Nursing and Midwifery Research Journal*, Vol 9, No 4
- Rumball JS, Lebrun CM (2004). Preparticipation physical examination: selected issues for the female athlete. *Clin. J. Sport Med.* 14: 153-160.
- Shahrjerdi Sh, Sheikh Hoseini R (2010). The effect of 8 weeks stretching exercise on primary dysmenorrhea in 15-17 aged high school students girls in Arak. *J. Shahrekord Univ. Med. Sci.* 11(4): 84-92.
- Shahr-jerdy S, Hosseini RS (2012). Effect of stretching exercises on primary dysmenorrhea in adolescent girls. *Biomed. Human Kinetics* 4: 127-132.
- Sharma M, Gupta S (2003). Menstrual pattern and abnormalities in high school girls of Dhahran: a cross sectional study in two boarding schools. *Nepal Med. Coll. J.* 5: 34-36.
- Shavandi N, Taghian F, Soltani V (2009). The effect of isometric on primary dysmenorrhea. *Arak Medical Uni. J. (AMUJ)*, 13(1): 71-77.
- Usha N, Madhavi K (2013). Meditation and yoga as alternative therapy for primary dysmenorrhea. *Int. J. Med. Pharmacol. Sci.* 3: 39-44.