MAAUN INTERNATIONAL MULTIDISCIPLINARY JOURNAL OF RESEARCH AND INNOVATIONS (MIMJRI)
A Publication of the Institute of Africa Higher Education Research and Innovations (IAHERI)
in Collaboration with
Maryam Abacha American University of Niger (MAAUN) Maradi, Niger Republic
Maiden Edition/Volume 1, October, 2023
ISSN: 3027 – 0294 DOI: https://doi.org/10.59479/jiaheri.v1i001.42

Effect of Twelve Week Jogging Exercise on Premenstrual Syndrome Among Adolescents in Selected Secondary Schools in Kano State Nigeria

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Abstract

This study investigated the effect of twelve-week jogging exercise on premenstrual syndrome and primary dysmenorrhea among adolescents in selected schools in Kano State Nigeria. Three research questions one major hypothesis and three sub hypotheses were formulated to guild the study. Repeated measure research design was used for the study. The population of the study comprise of 551255 female students (both boarding and day students) with premenstrual syndrome and primary dysmenorrhea in the 4 selected schools which were selected randomly. The sample size used for this study was 79 students. A purposive sampling technique of homogeneous type was used to select the sample for the study. In which 20 students were selected from each school using a simple questionnaire of YES and NO. YES for those with premenstrual syndrome and primary dysmenorrhea and NO for those without premenstrual syndrome and primary dysmenorrhea. Only 79 of those who choose YES were selected for the study. Participants were evaluated for pain pre –test 0th week and subsequently following intervention posttest with aerobic exercise (jogging) at 6th and 12th week three times a week each week. The evaluation was conducted using Visual Analogue Scale (VAS). Similarly, the McGrill Quality of Life Questionnaire (MQLQ) was administered to determine participants' quality of life. The data obtained was analyzed using repeated measure ANOVA and Scheffe's post -hoc to reveal the statistical significant effect. The results indicated statistical significant effect after 0th, 6th and 12th week of jogging exercise programme $F(2, 76) = 3.11$;($P<0.05$). It was therefore concluded that jogging exercise had effect on premenstrual syndrome $F(2, 76)=3.11$:($P<0.05$) and primary

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dysmenorrhea F(2, 76)=3.11;(P<0.05) and subsequently on the quality of life of the adolescent girls F(2, 76)=3.11;(P<0.05). It was recommended among others that jogging exercise should be included in the management of premenstrual syndrome and primary dysmenorrhea. **Keywords:** Jogging Exercise, Premenstrual Syndrome, Adolescents, Secondary Schools

Introduction

Females possess distinct qualities attributed to the presence of hormones like estrogen and progesterone making them unique. This uniqueness brings about the menstrual cycle which is regulated by some hormones like Luteinizing hormone and follicle stimulating hormones which are produced by the pituitary gland to promote ovulation and stimulates the ovaries to produce estrogens and progesterone which trigger the menstrual cycle. The process of the menstrual cycle involves some changes in the individual females that comes with series of problems that cause a lot of pain and discomfort called premenstrual syndrome.

Premenstrual syndrome (PMS) is a very common condition that affects a woman's emotions, physical health, and behaviour during certain days of the menstrual cycle generally just before menses (Gnanasambanthan & Datta, 2019). Though, recognized for centuries by clinicians, the distressing symptoms which occur cyclically in women prior to the menses were first described in 1931 (Frank, Dixon, & Grosz, 1993). PMS is a set of physical, emotional and behavioural symptoms that starts during the week preceding menstruation and are alleviated when the menstrual flow begins (Marván & Cortés-Iniestra, 2001). Premenstrual syndrome (PMS) is a major clinical entity afflicting a large segment of the female population. Its symptoms often vary between women and resolve around the start of bleeding. Common symptoms include acne, tender breasts, bloating, feeling tired, irritability, and mood changes. Often symptoms are present for around six days (Office of Women Health, 2018). A woman's pattern of symptoms may change over time and symptoms do not occur during pregnancy or following menopause (American College of Obstetricians and Gynecologist, 2015)

This syndrome is usually associated with pain in the breast, abdomen, back , joints, muscles or pelvis and gastrointestinal problems including constipation, diarrhoea, nausea, vomiting passing excessive amount of gas and water retention. In some cases appetite changes excessive hunger, fatigue or loss of appetite abdominal fullness or cramping are common. Also common among others are acne, depression, headache, insomnia and irritability, lack of concentration, moodiness, sweating, painful menstruation or weight gain. Some women have severe back and thigh pain and an unpleasant general feeling which affect more than 90 percent of menstruating women (Khatiwada, Silwal, Bhadra, & Tamang, 2013). For PMS to be diagnosed, the affected person must be impaired in some aspect of life. PMS symptoms start five to 11 days before menstruation and typically go away once menstruation begins (Ryu & Kim, 2015).

The cause of PMS is unknown to some authors (Hofmeister & Bodden, 2016). However, the aetiology of the syndrome is controversial, and has been extensively reviewed (Wyatt,

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Dormick,, Jones, O'Brien, 1999; Frackiewicz & Shiovitz, 2001). These include, a combination of low zinc and copper retention (Chuong &Dawson, 1994), abnormal serotonin function (Eriksson, 1999) deficiency of progesterone, some neurotransmitters, nutrients such as vitamin E, B vitamins, calcium, linolenic acid, magnesium manganese, etcetera, (Wyatt, Dimmock,, Jones & O'Brien, 1999; Wyatt, Dimmock, Jones & Obhrai, 2001). However, many researchers believe that it's related to a change in both sex hormone and serotonin levels at the beginning of the menstrual cycle. Levels of oestrogen and progesterone increase during certain times of the month. An increase in these hormones can cause mood changes. (Humade & Ibraheem, 2018).

There are many risk factors associated with PMS. They include a history of depression or mood disorders, such as postpartum depression or bipolar disorder (Sylvén, Ekselius, SundströmPoromaa, & Skalkidou, 2013) , a family history of PMS, physical trauma, emotional trauma , some associated conditions like dysmenorrhea, major depressive disorder , seasonal affective disorder, generalized anxiety disorder, schizophrenia, a family history of depression, domestic violence and substance abuse. (Cheng, Shih, Yang, Chen, Chang, & Yang, (2013) (Tadakawa, Takeda, Monma, Koga, & Yaegashi, 2016) , (Sylvén, Ekselius, Sundström-Poromaa, & Skalkidou, 2013)

Premenstrual syndrome has been reported in 40-95% of menstruating women (Frackiewicz & Shiovitz, 2001; Pray, 1998). For most of these women, PMS is a minor problem (Chuong & Dawson, 1994) while some even report positive features such an increased industriousness, energy, creativity and sexual interests (Choi and McKeown, 1997; Pray, 1998). The syndrome may begin at any phase of reproductive life but is more commonly reported by women in the later reproductive years and in those with more years of natural menstrual cycles (Reid, 1993). In Nigeria geographical variations do exist in the prevalence of premenstrual dysmenorrhea must probably due to under reporting, as most females regard pain during menses as the price of their gender. Yet the prevalence of premenstrual syndrome and dysmenorrhea is still very high amongst adolescents and young adults ranging from as low as 33% - 38.7% to as high as 74% in Nigeria. (Kawuwa, Kullima, Audu, & Mairiga, 2008). According to Ogunfowokan & Babatunde, (2010) in eastern Nigeria the prevalence of premenstrual syndrome and primary dysmenorrhea was quite high which is about 59.5% and the prevalence of primary dysmenorrhea in Maiduguri North Eastern Nigeria was 69.8% while in Oyo state western Nigeria was 62% . In Kano, Northern Nigeria it was also documented that the prevalence of dysmenorrhea among school adolescents was 42,5% and12,5% respectively (Rabiu, Abubakar & Garba, 2019). The difference in the prevalence could be attributed to differences in culture, diet and lifestyle in the different regions. However, there is paucity of documented study in Kano on the effect of exercise on premenstrual syndrome.

About 200 symptoms have been implicated in PMS. (Halbreich, 2004). A woman's menstrual cycle lasts an average of 28 days. Ovulation, the period when an egg is released from the ovaries, occurs on day 14 of the cycle. Menstruation, or bleeding, occurs on day 28 of the cycle. PMS symptoms can begin around day 14 and last until seven days after the start of menstruation). The

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symptoms present a cyclic and recurrent character and may be variable in quantity and intensity. For the symptoms to be considered to represent the syndrome, it is necessary that some impediment be reported with regard to routine activities at work, at school or in social activities. (Johnson ,1987, The symptoms of PMS are usually mild or moderate. slight symptoms during the premenstrual period that are presented by the majority of women, and which do not interfere in the daily routine, are not considered to form part of the diagnosis of PMS Nearly 80 percent of women report one or more symptom that does not substantially affect daily functioning, according to the journal American Family Physician. Twenty to 32 percent of women report moderate to severe symptoms that affect some aspect of life. The most common symptoms of PMS include, abdominal bloating, abdominal pain, sore breasts, acne, food cravings, especially for sweets, constipation, diarrhea, headaches, sensitivity to light or sound, fatigue, irritability, changes in sleep patterns, anxiety, depression, sadness, emotional outbursts. (Epstein,Hockaday & Hockaday 1978). PMS has been reported in 40-95% of menstruating women (Frackiewicz and Shiovitz, 2001; Pray, 1998). For most of these women, PMS is a minor problem (Chuong and Dawson, 1994) while some even report positive features Aerobic exercises include activities such as walking, jogging, swimming and biking. Energy is supplied by oxygen delivered to exercising muscles. When sufficient oxygen is not available, exercising muscles must depend on anaerobic metabolism.

Jogging exercise which is one of the types of aerobic exercise produces a characteristic ‘training effect in which its cardiovascular adaptations include reduced heart rate at rest and at submaximal workloads, increased work capacity, and increased maximal oxygen consumption (VOz max). The effects of jogging and exercise can be seen in weight loss, improved bone health, developed muscles, keeping the mind healthy, good for the heart, improved respiratory system and boosts of immunity.

Previous studies to assess the effect of regular aerobic exercise for a minimum of twelve weeks has been documented in literature as seen in the work of Gbanbari, Manshavi, Jafarabad (2008) and Cicek (2018). Similarly, the researcher used twelve weeks for the study.

According to Barrie, (2017) exercising, keeping active or working out can help relieve the symptoms that make getting periods so annoying. The more active one is and more regular one is with activity, the better the periods end up being less cramping and with less heavy flow. He added that when one sweats, water leaves the body, which can relieve uncomfortable bloat. Exercise also releases mood-boosting endorphins, which anecdotal evidence suggests might at least take one’s mind off discomfort or pain. And, a recent study revealed a correlation between higher levels of physical fitness and fewer premenstrual syndrome (PMS) symptoms.

Sims (2014), posited that the best workout to do during periods is High-intensity interval training and that during menstrual period oestrogen and progesterone levels drops and because of this, women can access carbohydrate/glycogen easily, as compared to high-oestrogen time periods when we rely more on the slow breakdown of fat." In other words, this hormone shift makes fuel more accessible to the body, allowing one to push harder and get more out of short fast-paced

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workouts than would be during other times of the month**.** He added that exercise keeps the body really cool. The body temperature is actually lowered during periods, due to low-hormone phase. "This increases time to fatigue, and allows the body to store more heat without hitting the tipping point of central nervous system fatigue," and during this time one can tolerate hotter and more humid climates.

The idea that exercise might help relieve premenstrual syndrome and menstrual pain is not new; in 1943 Billig proposed that women with dysmenorrhoea had contracted ligamentous bands in the abdomen and subsequently developed a series of stretching exercises for which he claimed a high rate of symptom relief (Brown & Brown, 2010). The belief that exercises were effective seems to have prevailed and led to anecdotal beliefs among health agencies, clinicians, and women that exercise is beneficial.

Exercise is often seen as a panacea or the 'magic potion' for health problems and disease, without proper regard or scrutiny of the evidence. (National Institute for Health and Clinical Excellence 2006). Indeed, it might also seem intuitively appealing to promote exercise as a treatment for menstrual disorders such as PMS and primary dysmenorrhea, there is a paucity of evidence to directly support such a view. Of course, there are many other important health reasons for encouraging women to be physically active throughout their lives, and good evidence supports the effectiveness of exercise for conditions such as cardiovascular diseases (Jolliffe, Rees & Taylor, 2000) and exercise is unlikely to be harmful if not performed in moderation.

Statement of the Problem

Menstruation is supposed to be a blessing to young girls and women but for many young girls it comes with a lot of discomfort. This discomfort which is known as Premenstrual syndrome (PMS) is very common amongst adolescents and it is one of the most common gynecological problem that causes absenteeism and loss of productivity (Padmavathi, Sankar,& Kokilavan, 2012). This is also supported by reports from the school dispensaries used for this study in the study area. The social economic burden of premenstrual syndrome is high and because of these women and girl get a lot of advice that does not really work or help with this problem.

With all these advice and management the only thing that has been scientifically proven to relieve PMS so far are birth control pills and painkillers such as Ibuprofen or Naproxen. These painkillers known as Non-Steroidal Anti-inflammatory Drugs (NSAIDs) lower the production of prostaglandin, thereby relieving period pain. Although, NSAIDs are usually well tolerated, they sometimes have side effects, especially stomach related problems. (Marjoribanks, Ayeleke, Farquhar & Proctor, 2015) and some of these adolescent girls develop stomach ulcers in the process of taking these NSAIDs. Premenstrual syndrome affects the quality of life of adolescent girls and in severe cases, leads to inability to function in the school or work place (Dehnavi, Jafarnejad, & Kamali, 2018).

Exercise on the other hand is becoming increasingly popular in the treatment of ailments but the believe that exercise works for relieving symptoms of premenstrual syndrome is based on

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anecdotal evidence non-experimental studies. There are limited evidences from randomized controlled trial to support the use of exercise to reduce the discomfort of premenstrual syndrome. Although, premenstrual syndrome affects many women and girls round the world they basically have very little choices to make in terms of treatment and few researches are done to find solution to this problem that affects women and girl's quality of life. It is because of this that the researcher evaluated the effectiveness of jogging exercise to reduce the intensity of pain and discomfort and improve the quality of life of adolescent students with premenstrual syndrome using the target heart rate. In view of the stated problem and the occurrence of these conditions in the study area among adolescence the study answered the following research questions.

Will twelve weeks jogging exercise have effect on premenstrual syndrome among adolescent girls in Kano state?

Hypothesis

Twelve-week jogging exercise will not have significant effect on premenstrual syndrome.

Methodology

Repeated measures research designs, also known as a within-subjects designs was used for this study. The population of the study included all students (both boarding and day students) with premenstrual syndrome in the 4 selected secondary schools in Kano state estimated to be about approximately 551255 (Educational statistics, 2020) in number which was selected through a simple random technique from 6 schools. The schools include, Government Girls College Dala, Government Girls Arabic College Goron Dutse, Government Girls Secondary School Shekara and Government Girls College (W.T.C.) Kano.

A total of 79 adolescent students were selected to participate in the study using a purposive sampling technique of homogeneous type. In which 20 students were selected from each school. 39 students from two schools were used as the experimental group while the other two schools of 40 students were used as control group. Only the adolescents that satisfy the inclusion, criteria were eligible to participate from the selected schools.

Inclusion Criteria

All adolescent students aged between 13 to 16years. With a history of premenstrual syndrome or with minimum of three premenstrual symptoms. Must be in the selected schools.

Exclusion Criteria

The inclusion criteria include all adolescent students aged between 13 to 16years who have a normal period of the range of (21 to 35) days with a history of pre- menstrual syndrome in the selected secondary schools not exercising.

Participants were excluded if their Premenstrual syndrome is associated with dysmenorrhea of secondary source with underlying pathologies. Participants with heavy bleeding, who use more

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than two packs of sanitary towels, diabetes, hypertension or any systemic problem were also excluded.

An introductory letter was obtained from the Human Kinetics and Health Education Department in the University and was taken to the management of the selected secondary schools that were used for ethical clearance since it is a study involving human subjects after obtaining permission from Ministry of Education who govern all the schools in Kano State. All participants who met the inclusion criteria were made to fill a simple questionnaire of YES or NO. Yes indicating the student experience premenstrual syndrome and NO indicating no premenstrual syndrome. A purposive sampling technique of homogeneous type was used to select the experimental group which were the yes group. A total of 79 participants who were selected were asked to sign a written informed consent. Using one research assistant in each of the selected secondary schools the anthropometric and physiologic measurements which included the age was noted while height was measured with a meter rule calibrated on the wall, weight was measured with a portable bathroom weighing scale (SECA) MODE H89 RDE made in China and blood pressure measured with a mercury sphygmomanometer which consist of an inflatable rubber cuff which is wrapped around the upper arm connected to an apparatus that records pressure, usually in terms of the height of column of mercury used together with a stethoscope. How much sugar is in the blood was also recorded with a glucometer. The drop of blood you get with a finger prick with a Lancet needle was used to test a strip for each of the participants. Pain before (0 week), during (6 week) and after(12 week) aerobic exercise in form of jogging were measured for all participants using the Visual Analogue Scale(VAS) which is a sheet of paper with a ten (10) cm mark to indicate their level of pain before the exercise and at the 6^{th} and 12^{th} week of exercise training. (Appendix i i) and to rate their pain. McGill Quality of Life Questionnaire (MQOLQ) was used to evaluate the quality of life of the participants two days into their periods. (Appendix iii). McGill Quality of Life Questionnaire is a multidimensional tool designed to measure the physical well-being and support as well as overall quality of life, created for people at all stages of life.

Training programme

A 20meter line was drawn on the floor. Selected students for the jogging exercise training were made to do 5 minutes warm up exercises which include stretching, jogging, and jumping on the spot exercises. Following which participants were made to jog from the beginning of the drawn line to the end repeatedly until they get to their calculated target heart rate that was timed with a heart rate monitor which the participants wore on their wrists. Immediately the heart rate monitor beeps, the participants were then made to do 5 minutes cool off exercise. This exercise was done three times a week Monday, Wednesday and Friday. Participants would start with a 50% of their maximum heart rate the first 4weeks then 60% of their maximum heart rate the second 4 weeks and 70% of their maximum heart rate at the last 4 weeks of exercise. Research assistants who were recruited were taught how to assist the researcher in the study in each of the schools.

Calculation of Target Heart Rates:

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Maximum heart = 220 – Age of participate
Max heart rate = 220 - 13 =117 beats per minutes, therefore, the target heart rate using 70 percent of the maximum heart rate is 117 × 0.70 = 82 hpm approximately
Max heart rate = 220 – 14 = 116 beats per minutes, therefore. The target heart rate using 70 percent of maximum heart rate is 116 × 0.70 =81 hpm approximately
Max heart rate = 220 - 15 = 115 beats per minutes, therefore, The target heart rate using 70 percent of maximum heart rate is 115 × 0.70 = 81hpm approximately.
Max heart rate = 220- 16 = 114 beats per minutes, therefore the target heart rate using 70 percent of maximum heart rate is 114 × 0.70 = 80 hpm approximately.

At the end of sixth and twelve weeks data was recorded and descriptive statistics of mean, standard deviation, frequency and percentages were used to organize the data. While repeated measures ANOVA was used to analyze the hypotheses formulated at 0.05 level of significance. . This is to enable data collected before, during and after exercise to be incorporated. Also, Scheffe's Post-hoc test was used to reveal the statistical significant effect.

Results and Discussion Table: 1 Physical Characteristics of Participants

VARIABLE	N	MIN	MAX	MEAN	SD
Age	79	13.00	16.00	14.5823	0.51742
Weight	79	50.00	58.00	53.6203	2.69522
Height	79	1.30	1.70	1.5114	0.12709
BMI	79	17.30	33.72	23.9497	4.31256

Table 4.1 above shows a descriptive statistic of mean and standard deviation of the physical characteristics of the participants. Total number of the participants is 79, the minimum and maximum ages was 13 and 16 years while their mean age and standard deviation was 14.5823 and 1.05742 respectively. The minimum and maximum weight are 50kg and 58kg respectively while the mean and standard deviation are 53.6203 and 2.69522. The minimum and maximum height was 1.30m and 1.70m while the mean and standard deviation was 1.5114 and .12709. The minimum and maximum BMI are 17.30kg/m2 and 33.72kg/m2 while the mean and standard deviation are 23.9497 and 4.31256 respectively

Hypothesis 1

Twelve weeks jogging exercises will not have significant effect on premenstrual syndrome among adolescent girls in Kano state.

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Table 2: Repeated measures analysis of variance on pain of adolescent students with premenstrual syndrome for differences before, during and after twelve weeks jogging exercises program

Source		Type III Sum of Squares	Df	Mean Square	F	Sig.
factor1	Sphericity Assumed	258.991	2	129.496	95.542	.000
	Greenhouse-Geisser	258.991	1.367	189.480	95.542	.000
	Huynh-Feldt	258.991	1.401	184.918	95.542	.000
	Lower-bound	258.991	1.000	258.991	95.542	.000
Error(factor1)	Sphericity Assumed	103.009	76	1.355	1.983	
	Greenhouse-Geisser	103.009	51.941			
	Huynh-Feldt	103.009	53.222	1.935		
	Lower-bound	103.009	38.000	2.711		

F (2, 76) = 3.11; P < 0.05 *=Significant

Table 2 showed that there were significant effects of twelve weeks jogging exercise on the pain of adolescent girls with premenstrual syndrome. The table presents a repeated measures analysis of variance for the variable pain with three time points: before, during, and after the jogging exercise program. The results presented in Table 4.2 indicate that the F-statistic is 95.542 with a degrees of freedom of 2 and 76, and a probability (p-value) less than 0.05, which is statistically significant at the standard significance level of 0.05. However, this significance is due to the interaction effect between time and group (factor1), which suggests that there are differences in pain levels between the three time points for both groups (before, during, and after jogging exercise). Furthermore, the table presents three types of adjustments for sphericity: sphericity assumed, Greenhouse-Geisser, and Huynh-Feldt. The significance level for the F-statistic remains significant for all three adjustments, indicating that there are differences in pain levels between the three time points for both groups (before, during, and after jogging exercise). However, when examining the mean square values for each time point (before, during, and after jogging exercise), it can be seen that there are no significant differences between the mean scores for pain levels before and after jogging exercise (mean square values of 129.496 and 258.991, respectively). This suggests that there were significant effects of twelve weeks jogging exercise on the pain of adolescent girls with premenstrual syndrome based on the data presented in Table 2 alone. Therefore, there are differences in pain levels between the three time points for both groups (before, during, and after jogging exercise), there are no significant differences between the mean scores for pain levels before and after jogging exercise among adolescent girls with premenstrual syndrome based on the data presented in Table 2 alone.

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To establish which phase of exercise that was responsible for the significant difference; Scheffe's post hoc test was applied on the means at baseline, 0 week, 6th week and 12th week, the result of is presented in Table 3.

Table 3: Results of Scheffe's Post-hoc tests on the means of pain of adolescent students with premenstrual syndrome before, during and after jogging exercise program

(I) factor1	(J) factor1	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	Upper Bound
Oweek	6week	2.205*	.341	.000	1.515	2.896
	12week	3.615*	.228	.000	3.153	4.078
6week	Oweek	-2.205*	.341	.000	-2.896	-1.515
	12week	1.410*	.200	.000	1.005	1.816
12week	0week	-3.615*	.228	.000	-4.078	-3.153
	6week	-1.410*	.200	.000	-1.816	-1.005

*=Significant at 6week and 12week

Table 3 showed that the significant difference in the means of 12week was due to the mean difference of baseline vs 6th week (sig.000) and baseline vs 12th week (sig.000). It was revealed by this exercise program that there was visible statistical significant difference between the 6th and 12thweek of exercise.

Discussions

This study investigated the effects of twelve weeks jogging exercise on premenstrual syndrome in adolescent girls in selected schools in Kano State. The statistical analysis revealed that twelve weeks jogging exercise has significance on premenstrual syndrome among adolescent girls. The findings of the study was in harmony with the study of Israel, Sutton, O'Brien, (1989) in the effects of aerobic training on primary dysmenorrhea, symptomatology in college females. In the randomized trial of aerobic exercise in 36 college-age women which demonstrated a decrease in 'menstrual symptoms', but failed to distinguish between premenstrual complaints and dysmenorrhea. The study was also in conformity with the work of Prior, Vigma, and Alojado (1986) in their work conditioning exercise decreases premenstrual syndrome which demonstrated that after 3 months of regular running, previously sedentary individuals noted decreased symptoms of breast tenderness and fluid retention. Although there was no control group initially, the study was extended to 6 months, a non-exercising control group was added, and also a group of runners who increased their distances as part of marathon training was included. The study also have similar results with the work of Virk (2019) in his study effects of eight weeks aerobic exercise on

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non- athelete girls showing a symptom of premenstrual syndrome who did a quasi-experimental study with 40 non athlete girls aged between 18 to 25 with premenstrual symptoms. The study showed that aerobic exercises such as walking, jogging, running, stretching of quadriceps and hamstrings proved as a fruitful and positive approach in reducing the signs and symptoms of premenstrual syndrome. Vishnupriya and Rajarajeswaram, (2012) whose study also examined the effect of aerobic exercise with different severity (low, moderate, severe) on 61 women with Premenstrual syndrome for 6 weeks, the results showed that symptoms of PMS were significantly decreased in moderate intensity with aerobic exercise.

Similarly the work of Samadi,Taghvan & Valiani (2013) which investigated the effects of eight weeks of regular aerobic exercise on the symptoms of premenstrual syndrome in non- athlete girls reported premenstrual syndrome reduced by 50% while physical symptoms reduced by 29% and psychological symptoms reduced by 33% and by eight weeks this reduction rates were 60%, 65% and 52% respectively. These findings indicate that four weeks of aerobic exercise can be expected to reduce PMS symptoms. However, the reduction in PMS symptoms after eight weeks was significantly better than the results observed after four weeks

The study of Yekke Azimi & Sadeghi (2013) in the effects of aerobic and walking exercise physical and psychological symptoms and pain of premenstrual syndrome also confirms the assumption that regular physical activity has a beneficial effects on the symptoms of premenstrual syndrome (P= 0.02). During previous research the extent to which 3months of aerobic and walking based physical exercise influence the physical and mental symptoms of PMS and pain caused by menstruation was examined. The results revealed a significant difference in physical symptoms after one menstrual cycle. But Sanchez (2023) reported in his narrative review that Czajkowska et al, (2015) in their study menstrual cycle and the prevalence of premenstrual syndrome, premenstrual dysphobic disorder in adolescent athletes reported that aerobic exercise does not affect symptoms of premenstrual syndrome. While David, Bella, Berenstein, Lopes, Vaisberg, (2009) also reported that aerobic exercise had a negative effect on symptoms of PMS in their study incidence of premenstrual syndrome in sport practice. The findings of this study revealed that 12weeks jogging exercise had significant effect on premenstrual syndrome amongst adolescents and indicates that 12 weeks aerobic exercise significantly reduced pain and discomfort of premenstrual syndrome. This findings is in line with the study of Aganoff and Boyle, (1994) who studied on mood and menstrual cycle and reported less premenstrual syndrome (PMS) symptoms in women who are physically active, but no randomised controlled trial that includes a no-exercise comparison group were used. One small (n = 23) randomised trial has assessed the effects of two exercise intervention (strength training versus aerobic exercise) and found that PMS scores were significantly improved at follow up in both exercise groups. There have also been two very small non-randomised controlled trials (n = 14 and n = 21 respectively) that have examined the short and longer term effects of exercise upon PMS; improvements in some symptoms were reported in both trials.

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Maiden Edition/Volume 1, October, 2023
ISSN: 3027 – 0294 DOI: https://doi.org/10.59479/jiaheri.v1i001.42

But Silva and Sadler, (2006) research reported that aerobic exercise does not affect symptoms of premenstrual syndrome. While David, Bella, Berenstein, Lopes, Vaisberg, (2009) Reported that aerobic exercise had a negative effect on symptoms of PMS.

The difference in these studies may be as a result of the type, duration and extent of physical activity used in the studies.

While the effect seen in the studies above may be as a result of the release of endorphin during exercise and the subsequent effect of pain relieve. Exercise produce sweats and water leaves the body, which can relieve uncomfortable belly bloat and breast tenderness and fullness and the other symptoms associated with premenstrual syndrome. Exercise also releases mood-boosting endorphins, which anecdotal evidence suggests might at least take one's mind off discomfort or pain. All these could be the reason for the improved quality of life. **Recommendations**

Based on the conclusions of the study the following recommendations were made:

1. Jogging exercises should be incorporated in the management of premenstrual syndrome and primary dysmenorrhea to improve the quality of life of adolescent students suffering from these problems.
2. Medical personnel should use jogging exercise in the management of premenstrual syndrome and primary dysmenorrhea as an alternative treatment among adolescents.
3. Schools should encourage and enlightened female students on the benefits of jogging exercises and enforce it on the student's curriculum.

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