Effect of Aerobic Exercises on Intensity of Primary Dysmenorrhea among Nursing Students

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Abstract

Background: Primary dysmenorrhea, characterized by painful cramps of the uterus during menstruation, affects 45–95% of menstruating women. Dysmenorrhea is the leading morbidity among gynecological disorders and the leading cause of pelvic pain. It affects the physical, psychological, and social status of female adolescents. Aerobic exercises help in reducing pain, relieving stress, elevating mood and improving health. Therefore, the present study aimed to evaluate the effect of aerobic exercises on intensity of primary dysmenorrhea among nursing students.

Subjects and methods: A Quasi experimental design was used in carrying out this study. A purposive sample of 100 female students, who divided into two groups control group and (aerobic exercise) performed exercises 3 times a week for 12 weeks (3 subsequent menstrual cycles). The tools used for data collection were: a structured Interview Questionnaire, visual Analogue Scale (VAS), WaLIDD Scale and Moo’s Menstrual Distress Questionnaire (MDQ).

Results: female student’s age ranged between 18-22 years. Intensity of pain was decreased in aerobic group compared to control group with highly statistical significant difference (p < 0.001). Furthermore, WaLIDD total score was reduced with highly statistically significant differences (p < 0.001) in aerobic vs. control group. Menstrual distress symptoms were improved in aerobic group.

Conclusion: Aerobic exercises were effective in reducing intensity of dysmenorrhea and improving menstrual distress symptoms compared to control group. Recommendations: Aerobic exercise therapy can be considered as a non-pharmacological option in the management of primary dysmenorrhea. Enhance student’s awareness and knowledge about effect of aerobic exercises by adding this topic into curriculums.

Key words: Primary dysmenorrhea (PD), Aerobic exercises, VAS, WaLIDD Scale, Moo’s (MMDQ)

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the pain pathways (Dos Santos et al., 2019). It has certain effects on blood pressure, depression, anxiety, and sleep (Suwabe et al., 2017). Additionally, it reduces the symptoms of dysmenorrhea in women who exercise regularly as they exhibit lower levels of physical symptoms across their menstrual cycle (Nwaezuoke and Gbonjubola, 2022).

The nurse has a vital role in reassuring, counseling and managing students with PD (Al-Matouq et al., 2019). As well as, when nurses are asked for advice regarding, menstrual problems, they have a valuable opportunity to engage in health teaching concerning menstrual physiology; hygiene; and the importance of a well-balanced diet, exercise, and general health maintenance (Hockenberry et al., 2021). Therefore, the current study aimed to evaluate the effect of aerobic exercises on intensity of primary dysmenorrhea among nursing students.

2. Subjects & Methods
2.1. Design:
A Quasi experimental design was used to carry out the present study.

2.2. Setting:
The present study was conducted at faculty of nursing, Zagazig University.

2.3. Subjects:
The existing study enrolled 100 female students, who complained of mild to moderate dysmenorrhea. The subjects of present study included two equal groups of female students, 50 students in each group. The selected female students were divided into control group and intervention group (aerobic exercises), who were selected from the study setting as follows:

<table>
<thead>
<tr>
<th>Group I:</th>
<th>Control group (n=50)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group II:</td>
<td>Aerobic exercises group (n=50)</td>
</tr>
</tbody>
</table>

Consecutive menstrual cycles), the follow-up schedule sheet was obtained from the female students.

1. Introduction
Dysmenorrhea refers to pain during menstruation. It is classified into primary (PD) and secondary dysmenorrhea. Unlike primary dysmenorrhea, secondary dysmenorrhea is associated with pelvic pathology. The prevalence of dysmenorrhea has been reported to range from 15.8 to 89.5%, with ~20% experiencing condition as severe (Alshahrani, 2020). The onset of PD usually occurs in adolescence, at approximately 6-24 months after menarche. PD is characterized by painful cramping that lasts for 8-72 hours that is most severe during the first or second day of menstruation. Typically, pain is frequently accompanied by symptoms such as dizziness, vomiting, fatigue, and insomnia (Hu rt et al., 2020).

The diagnosis of dysmenorrhea is based upon a woman's medical history and physical examination (Smith and Kaunitz, 2021). Management of menstrual cramps includes both pharmacological and non-pharmacological strategies (Armour et al., 2019). Various methods have been used to treat dysmenorrhea. It is conventionally treated with non steroidal anti-inflammatory drugs (NSAIDs) or oral contraceptive pills (OCPs), and research evidence supports their efficacy. However, NSAIDs and OCPs have limitations because they may not be effective in some women, there may be contraindications or adverse effects in others; some may not prefer to use any medications. Various contemporary therapies are available to treat dysmenorrhea; these include herbs, heat, physiotherapy, physical activity and yoga (Mittal, 2019).

Aerobic exercise stimulates the release of endorphins that relieve pain by inhibiting...
Sampling Technique:
The female students were selected through purposive sampling from 4 academic years according to the following inclusion and exclusion criteria

Inclusion Criteria:
The study sample was collected according to the following criteria:
1. Single female students.
2. Regular menstrual cycle (28 – 35 days).
3. Mild to moderate primary dysmenorrheal pain; (VAS) scoring ≤ 6.

Exclusion Criteria:
1. History of medical or gynecological diseases.
2. History of joint, motion, muscle, and bone diseases that reduce their abilities to exercise.
3. Professional athletic female students.
4. Receiving special dietary regimen.

2.4. Tools of data collection:
Four tools were used to carry out the present study, they were:

Tool I: A structured Interview Questionnaire (Appendix 1):
It was developed by the researcher in the light of the current related literature and composed of two parts to collect the basic data about the following:

Part 1: Demographic data of the studied subjects such as: age, telephone number, residence, income level, height and weight. The estimation of (BMI) was measured according to the following equation BMI = weight / height^2.

Part 2: Menstrual history included data about: age at menarche, duration, interval of menses, amount of blood loss during menses and expected date of next period (for follow up). Dysmenorrhea characteristics such as: onset of 1st dysmenorrhea, duration of dysmenorrhea

Tool II: visual Analogue Scale (VAS) (Appendix 2):
It was developed by (Huskisson, 1974) to assess the intensity of menstrual pain. It is a self-report measure consisting simply of a 10-centimeter line (Numerical Pain Rating Scale). It was used in the pre and post intervention for 3 subsequent menstrual cycles for the 2 groups (control and aerobic exercises groups) to record the intensity of menstrual pain by female students.

Scoring system:
The scores corresponding to pain intensity was as follows:

<table>
<thead>
<tr>
<th>Pain Intensity</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>No pain</td>
<td>0</td>
</tr>
<tr>
<td>Mild pain</td>
<td>1-3</td>
</tr>
<tr>
<td>Moderate pain</td>
<td>4-6</td>
</tr>
<tr>
<td>Severe pain</td>
<td>7-8</td>
</tr>
<tr>
<td>Intolerable pain</td>
<td>+8</td>
</tr>
</tbody>
</table>

location was included no part of the body, lower abdomen, lumbar region, lower limbs and / or inguinal region. It was used in 2 groups (control and aerobic exercises groups) to record grade of dysmenorrhea for 12 weeks intervention (3 subsequent menstrual cycles).

Tool III: WaLIDD Scale (Appendix 3):
It was developed by (Teherán et al., 2018) to assess dysmenorrhea and predict medical leave in university students. It consisted of (working ability, location, intensity, days of pain). The anatomical pain location included no part of the body, lower abdomen, lumbar region, lower limbs and / or inguinal region.
Scoring system:
WaLIDD score was categorized as the following:

<table>
<thead>
<tr>
<th>Without dysmenorrheal</th>
<th>Mild dysmenorrheal</th>
<th>Moderate dysmenorrheal</th>
<th>Severe dysmenorrheal</th>
</tr>
</thead>
<tbody>
<tr>
<td>= 0</td>
<td>= 1–4</td>
<td>= 5–7</td>
<td>= 8–12</td>
</tr>
</tbody>
</table>

2.6. Field work:
The fieldwork was carried out within the period of ten months, starting from the first of August 2020 to the end of May 2021. The researcher started to collect data through study phases.

In the first phase (Interviewing phase), the sample was selected according to the previously mentioned criteria from the faculty of nursing, Zagazig University. The researcher was obtained oral consent of students for their participation, after that they were divided into (control & aerobic exercises groups), each group include 50 students. The questionnaire was read, explained & all basic data was obtained through the interview (pretest). The interview took 10-15 minutes for each student. This was done individually or in small groups, ensuring privacy.

In the second phase (Assessment & implementation phase), program construction for the study group was designed to upgrade practice pertaining dysmenorrhea and aerobic exercises to reduce intensity of pain in primary dysmenorrhea & associated menstrual symptoms. It was included the following steps:

- Program assessment phase and program planning phase, the program was designed after extensive review of literature. **Self learning booklet** was prepared by the researcher in the light of the literature on the
cycles. The researcher used illustrations (videos – GIF pictures- booklet & posters).

In the third phase, program evaluation and follow up phase was done after exercises intervention. The expected date of menses was obtained and recorded for follow up process. Days of menstruation was excluded from the exercise program to assess pain & menstrual symptoms accurately. Evaluation & follow up was done for 3 subsequent menstrual cycles (for 12 weeks) for control and aerobic groups to evaluate the effect of aerobic exercises on intensity of primary dysmenorrhea among nursing students. The follow up process was done via phone calls & social media (Whatsapp, Messenger...Etc)

Program implementation phase, 50 female students were trained on aerobic exercises for (12 weeks 3 times per week for 30-45 minutes each time); while control group was observed without any exercises or used any chemical, herbal drugs and/or supplements to prevent their dysmenorrhea during their menstrual cycles. The researcher used illustrations (videos – GIF pictures- booklet & posters).

Finally, it was submitted to students in the beginning of the program together with the pretest. Booklet outlines (aerobic exercises) such as definition, benefits, general measures before practicing exercises, protocol of exercise, warm up exercises, types & steps of exercises and calm down exercises.

- Program implementation phase, 50 female students were trained on aerobic exercises for (12 weeks 3 times per week for 30-45 minutes each time); while control group was observed without any exercises or used any chemical, herbal drugs and/or supplements to prevent their dysmenorrhea during their menstrual cycles. The researcher used illustrations (videos – GIF pictures- booklet & posters).

- The warm-up period needed to reduce the risk of injuries and allow a gradual increase in heart rate
- Warm up exercises in the form of Free : Active movements of UL, LL and trunk, Stretching trunk flexors , Dynamic stretches, Cross toe touch...etc

- It not required any equipment and many efforts to learn and can be done at home
- Aerobic exercises: Such as: marching, single step touch, step touches front and back, forward walk, double step touch, grapevine, ”V” step, knee lift, leg curl , forward walk, reach outs, lunge side and back, “L” Step, squat, jumping jacks... etc

- Cool down exercises include: slow marching, leg and arm swings, Relaxation Exercises, Deep breathing, slow “V” step and “L” step, hamstring, .... etc

Modifications were done accordingly based on their judgment

**2.8. Ethical consideration:**

All ethical issues were taken into consideration during all phases of the study. Firstly, the research protocol was approved by the Research Ethics Committee (REC) in

Aerobic Exercise training program

**2.7. Validity**

It was ascertained by a panel of five experts in the field of Obstetrics and Gynecological & Psychiatric & mental health who reviewed the content of the tools for clarity, relevance, comprehensiveness and understandability. The recommended
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2.9. Statistical design:

After the collection of data, it was revised, coded and fed to statistical software SPSS version 20.0. Microsoft office excel software was used to construct the needed graphs. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations, and medians for quantitative variables. Quantitative continuous data were compared using Student t-test in case of comparisons between two independent groups. Qualitative categorical variables were compared using chi-square test. In order to identify the independent predictors of the scores of VAS, WaLIDD and MMDQ domains tests multiple linear regression analysis was used and analysis of variance for the full regression models was done. Statistical significance was considered at p-value < 0.05.

3. Results

As to the demographic characteristics of the studied groups, female student's age ranged between 18-22 years with a mean of age (20.42 ± 1.55, and 20.35 ± 1.47 respectively) in control & aerobic groups. They were selected from 4 academic years with no significant difference. Besides the majority of female students were from rural areas (86% and 84%) & vast majority had sufficient income (96% and 100%) in control & aerobic groups respectively. Moreover, the students in the studied groups had normal body mass index with a mean of (22.81 ± 3.36 in control &23.58 ± 2.62in aerobic groups respectively).

Table 1 shows menstrual characteristics of female students in the studied groups. The age at menarche ranged between 13-15 years (66.0% and 80%) and duration of menses ranged between 4-5 days (60.0% &74.0%) in control & aerobic groups respectively. Meanwhile, the vast majority of students in the studied groups had moderate amount of blood loss with normal menstrual cycle length (21-35 days).

Concerning intensity of pain using VAS, table 2 demonstrates no significant difference between studied groups before exercises (5.82 ± 0.63 &5.88 ± 0.33 respectively). However, intensity of pain decreased in aerobic compared to control group with highly statistical significant difference (p < 0.001).

Table 3 reveals distribution of the studied groups according to their anatomical pain locations for WaLIDD Scale. As seen, a sizable portion of students were affected at all sites (the most common sites were lower abdomen, lumbar region, lower limbs & inguinal region respectively) before exercises. Also, their pain locations were improved during 3 subsequent menstrual cycles in aerobic vs. control group with highly statistical significant differences (p < 0.001).

Table 4 illustrates WaLIDD total score of dysmenorrhea with a mean of (6.26 ± 0.88 in control &6.68 ± 0.55 in aerobic groups) before exercises. Furthermore, WaLIDD total score reduced in s aerobic vs. control group with highly statistical significant differences (p < 0.001).

As regards Moo's Menstrual Distress Questionnaire Figure 1 displays that all domains (pain, concentration, behavioral change, autonomic reaction, water retention, Zagazig University. The agreement of participants was taken by their acceptance to join our study (WhatsApp, messenger ...etc) after full explanation of the aim of the study to every student before participation. The title, objectives, tools and study interventions was illustrated for their cooperation as well as to allow the researcher to prepare regular arrangement for the intervention setting. The inclusion in the study was totally voluntary after the oral consent process. They were notified that they can withdraw at any stage of the research; also they assured that the information obtained during the study was confidential and used for the research purpose only.
The model explains 65% of variation in VAS scores.

Regarding the effect of Moo’s menstrual distress domains on the WaLIDD score Table 6 illustrates that behavioral change, negative effect, arousal and pain domains were a significant independent positive predictors. The model explains 88% of variation in WaLIDD total scores.

Concerning the effect of Moo’s menstrual distress domains on the VAS score Table 5 reveals that pain and arousal subcomponents were highly statistically significant independent positive predictors.
Table 3: Distribution of the studied groups according to their anatomical pain locations for WaLIDD Scale (n=100):

<table>
<thead>
<tr>
<th>Anatomical pain locations for WaLIDD Scale$</th>
<th>Control (n=50)</th>
<th>Aerobic (n=50)</th>
<th>Test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No part of the body</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before exercise</td>
<td>1</td>
<td>0</td>
<td>1.010</td>
<td>0.315</td>
</tr>
<tr>
<td>1$^{st}$ cycle</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2$^{nd}$ cycle</td>
<td>0</td>
<td>1</td>
<td>2.0</td>
<td>0.315</td>
</tr>
<tr>
<td>3$^{rd}$ cycle</td>
<td>0</td>
<td>23</td>
<td>29.870</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td><strong>Lower abdomen</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before exercise</td>
<td>48</td>
<td>50</td>
<td>2.041</td>
<td>0.153</td>
</tr>
<tr>
<td>1$^{st}$ cycle</td>
<td>49</td>
<td>44</td>
<td>3.840</td>
<td>0.050</td>
</tr>
<tr>
<td>2$^{nd}$ cycle</td>
<td>46</td>
<td>37</td>
<td>7.40</td>
<td>0.017</td>
</tr>
<tr>
<td>3$^{rd}$ cycle</td>
<td>49</td>
<td>20</td>
<td>39.870</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td><strong>Lumbar region</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before exercise</td>
<td>40</td>
<td>38</td>
<td>2.033</td>
<td>0.629</td>
</tr>
<tr>
<td>1$^{st}$ cycle</td>
<td>37</td>
<td>24</td>
<td>4.80</td>
<td>0.008</td>
</tr>
<tr>
<td>2$^{nd}$ cycle</td>
<td>38</td>
<td>8</td>
<td>16.0</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>3$^{rd}$ cycle</td>
<td>40</td>
<td>3</td>
<td>6.0</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td><strong>Lower limbs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before exercise</td>
<td>24</td>
<td>27</td>
<td>0.360</td>
<td>0.548</td>
</tr>
<tr>
<td>1$^{st}$ cycle</td>
<td>26</td>
<td>10</td>
<td>20.0</td>
<td>0.001</td>
</tr>
<tr>
<td>2$^{nd}$ cycle</td>
<td>25</td>
<td>5</td>
<td>10.0</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>3$^{rd}$ cycle</td>
<td>25</td>
<td>1</td>
<td>2.0</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td><strong>Inguinal region</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before exercise</td>
<td>20</td>
<td>19</td>
<td>0.042</td>
<td>0.838</td>
</tr>
<tr>
<td>1$^{st}$ cycle</td>
<td>23</td>
<td>11</td>
<td>22.0</td>
<td>0.011</td>
</tr>
<tr>
<td>2$^{nd}$ cycle</td>
<td>22</td>
<td>5</td>
<td>10.0</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>3$^{rd}$ cycle</td>
<td>21</td>
<td>2</td>
<td>4.0</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

*P.value (P< 0.05) significantly different
$ The total is not mutually exclusive

More than one answer was allowed

Table 4: Distribution of the studied groups according to WaLIDD total score of Dysmenorrhea (n=100):

<table>
<thead>
<tr>
<th>WaLIDD total score of Dysmenorrhea</th>
<th>Control (n=50)</th>
<th>Aerobic (n=50)</th>
<th>Test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before exercise</td>
<td>6.26 ± 0.88</td>
<td>6.68 ± 0.55</td>
<td>F= 416.538</td>
<td></td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Cycle</th>
<th>Mean ± SD</th>
<th>Control Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>6.50 ± 0.74</td>
<td>4.44 ± 0.76</td>
</tr>
<tr>
<td>2nd</td>
<td>6.90 ± 0.65</td>
<td>2.32 ± 0.91</td>
</tr>
<tr>
<td>3rd</td>
<td>7.04 ± 0.57</td>
<td>0.64 ± 0.69</td>
</tr>
</tbody>
</table>

(*) Statistically significant at p<0.05
(**) Statistically significant at p<0.01

F = two way ANOVA test

Figure 1: Distribution of the studied groups according to Moo’s Menstrual Distress Questionnaire Domains (n= 100)
Table 5: Multiple linear regression model on the effect of Moo’s menstrual distress domains on the VAS score:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>VAS Estimate</th>
<th>Standard error</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>6.28897</td>
<td>0.34175</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Groups</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>-3.24237</td>
<td>0.13512</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Aerobic</td>
<td>-0.60115</td>
<td>0.19492</td>
<td>0.002</td>
</tr>
<tr>
<td>Follow up</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before exercise</td>
<td>-1.38792</td>
<td>0.20351</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; cycle</td>
<td>-2.18158</td>
<td>0.20716</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; cycle</td>
<td>0.15132</td>
<td>0.03225</td>
<td>0.002</td>
</tr>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt; cycle</td>
<td>0.04587</td>
<td>0.01960</td>
<td>0.0198</td>
</tr>
</tbody>
</table>

A multiple regression was run to predict VAS, F (6, 393) = 122.3, p <0.001, Adjusted R<sup>2</sup> = 0.6459. All four variables added statistically significantly to the prediction, p <0.05.

Table 6: Multiple linear regression model on the effect of Moo’s menstrual distress domains on the WaLIDD total score:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>WaLIDD total score Estimate</th>
<th>Standard error</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>4.18895</td>
<td>0.23602</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Groups</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>-0.33078</td>
<td>0.08514</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Aerobic</td>
<td>-0.53790</td>
<td>0.12570</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Follow up</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before exercise</td>
<td>-0.97230</td>
<td>0.13500</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; cycle</td>
<td>-1.13449</td>
<td>0.13585</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Behavioral change</td>
<td>0.11708</td>
<td>0.02635</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Negative affect</td>
<td>0.05018</td>
<td>0.01421</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Arousal</td>
<td>-0.18916</td>
<td>0.02140</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Pain</td>
<td>0.20831</td>
<td>0.02069</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

A multiple regression was run to predict WaLIDD total score, F (8, 391) = 378.1, p <0.001, Adjusted R<sup>2</sup> = 0.8832. All six variables added statistically significantly to the prediction, p <0.05.

4. Discussion

Dysmenorrhea is one of the most frequently happened gynecological disorders among adolescent girls. Globally, the burden of dysmenorrhea range from 50% to 95% (Tadese et al., 2021). Primary dysmenorrhea (PD) is characterized by menstrual pain in the absence of a pelvic pathology (Fernández-Martínez et al., 2019). It is responsible for decreased quality of life, absenteeism from work or school, decreased participation in sports and social activities, altered pain perception, and sleep problems.

Regarding intensity of pain and associated menstrual symptoms, the existing study results achieved study aim and clarified that VAS and WaLIDD total score were reduced with highly statistically significant differences.

(Armour, et al., 2019). Pharmacological as well as non-pharmacological complementary and alternative therapies are potential options for managing PD (Kho and Shields, 2020). Physical exercise is nearly a new non-medical intervention to relieve PD associated pain (Jaleel et al., 2022).
days and 61% had a moderate amount of menstrual flow. In the same vein, a study conducted in Egypt by Afifi et al., (2018) mentioned that mean duration of menstruation was 4.77±1.14 and two-thirds of students had a moderate amount of blood during menstruation.

Concerning achieving research aim the current study reported that, there was no significant difference on pain intensity between studied groups before exercises. However, intensity of pain by VAS decreased in aerobic group compared to control group with highly statistical significant difference (p < 0.001) after exercises intervention. The explanation of pain intensity of primary dysmenorrhea may be due to pain is a subjective feeling and the perceived severity will depend on some factors including pain threshold. Moreover, Physical activity, which improves blood flow at the pelvic level while also increasing the production of endorphins, may help to relieve pelvic pain caused by excessive prostaglandins release; in fact, it operates as a non-specific analgesic (Abdul Aziz et al., 2021).

The study result was in acceptance by Lorzadeh et al., (2021) in Iran who reported that, there was a significant decrease in severity of menstrual pain following 12 weeks of exercise intervention. In confirmation with, Mostafa et al., (2020) at Cairo University in Egypt revealed that there was a significant difference in the numeric pain scale between groups (p=0.001). Additionally, (Parra-Fernández et al., 2020) in Spain indicated that the use of physical activity help to alleviate menstrual pain. Likewise, many studies by Rastogi et al., (2020) and Tharani et al., (2018) in India found that, Aerobic Exercises were more effective than (AS) in terms of reducing the intensity of dysmenorrhea.

In confirmation of study results concerning aerobic exercises effects, Stella Adaora et al., (2021) in India concluded that, 45-minute, 4-session per week for 12 weeks (p < 0.001) in aerobic vs. control group. Furthermore, menstrual distress symptoms were improved in aerobic group compared to control group.

The results of the current study showed that female student's age was about one fifth with a mean of age partially similar (20.42 ± 1.55, and 20.35 ± 1.47 respectively) in control & aerobic groups. Also, the students in the studied groups had normal BMI. The studied groups were homogeneous regarding the baseline demographic data. This might be attributed to minimize the effects of group differences that could affect outcome measures. This is in coherence with, a study conducted in Spain by Onieva-Zafra et al., (2020) found that women participated in their study had a mean age of 21.17 ± 2.56 years, and a mean BMI of 22.40 ± 3.17 m2/kg. In agreement with this result, Anandbabu et al., (2020) in India selected subject's age group from 17-23 years of age. Besides, Elbandrawy et al., (2020) in their study in Egypt about "Effect of Pulsed Electromagnetic Field Versus Aerobic Exercise on Primary Dysmenorrhea" found that, student age was ranged from 16-25 years. Also, their BMI was ranged from 20-25Kg/m2.

In the term of menstrual characteristics the current study revealed that, age at menarche ranged between 13-15 years and duration of menses was more than two thirds (ranged between 4-5 days) in the studied groups. Additionally, the vast majority of students in the studied groups had moderate amount of blood loss with normal menstrual cycle length (21-35 days). Possible explanation of such criterion about normal menstrual characteristics attributed to Primary dysmenorrhea is characterized by menstrual pain in the absence of a pelvic pathology (Fernández-Martínez et al., 2019). These findings go in line with Abreu-Sánchez et al. (2020) in Southern Spain who reported that mean age of menarche was 12.16 ± 1.54 years. The mean number of days per cycle was 29.84 ± 8.07, the length of menses (days of bleeding) was 4.97 ± 1.25.
with highly statistically significant (p< 0.001) for 3 consecutive menstrual cycles. Reducing intensity of pain may be due to the effect of exercising on the levels of steroid hormones in blood circulation of the women in reproductive ages. Moreover, the elevation of the endorphin hormone leads to an increase in pain threshold (Vaziri et al., 2015).

This finding is supported by study results carried out by Chougule et al., (2021) in India revealed that, there was statistically significant on VAS and WaLIDD scores with (p value 0.000) in reducing low back pain. As well, Patel et al., (2020) in India supported that, the use of chair aerobic exercise significantly reduced intensity of dysmenorrhea (WaLLID Score) with P-value (< 0.0001) in adult girls. In addition, Menstrual pain intensity was significantly decreased (P = .001) and the duration of pain was shorter (P = .001) in aerobic group compared with the control group after 8 weeks intervention (Samy et al., 2019).

As regards Moo’s Menstrual Distress Questionnaire, present study results illustrated that all domains (pain, concentration, behavioral change, autonomic reaction, water retention, negative effect and control) were reduced in aerobic groups vs. control group. Meanwhile, arousal increased in aerobic exercises group in comparison with control group after 12 weeks exercise intervention. The associated symptoms improving may be attributed to release the endorphin hormones in brain that raise the pain threshold by activating the prostaglandins synthesis inhibitors and may acts as decreasing short term depression and increase concentration and improve mood and behavior and distraction thoughts (Sutar et al, 2016)

The results of current study regarding symptoms of dysmenorrhea supported by Goradia and Revadkar, (2020) in India demonstrated that a high proportion of dysmenorrhea in adolescent girls and is associated with a variety of physical and aerobic exercise training programs were effective not only to reduce pain but to improve quality of life in females with primary dysmenorrhea. Further, Elbandrawy & Elhakk, (2021) stated that, there was significant differences in the aerobic exercise group regarding VAS (p = .001). As well as, Kannan et al., (2019) in New Zealand stated that, aerobic exercise had significant effects on primary dysmenorrhea-related pain and QoL. With similarity, Dehnavi et al., (2018) in Iran concluded that the severity of menstrual pain decreased at the end of 8 weeks of aerobic exercise intervention. On the other hand Berde et al., (2019) in India showed that core strengthening exercises was statistically significant in reducing VAS score (p=0.0004) than chair aerobics in females with PD.

The present study demonstrated that the vast majority of students were suffered from dysmenorrhea during 1-2 days of menses before exercises. Interestingly, the most common sites of anatomical pain locations for WaLIDD Scale were lower abdomen, lumbar region, lower limbs & inguinal region respectively before exercises. In the same vein, (Ryan, 2017) and (Burnett and Lemyre, 2017) mentioned that PD characterized by suprapubic colic-type pain that begins a few hours before or after the start of menstrual bleeding. The peak is usually between 24 and 48 h, coinciding with the time of maximum blood flow, and pain usually subsides after 2 or 3 days, as the blood volume decreases. Also, in primary dysmenorrhea pain is spasmodic in nature and pain felt in suprapubic area [lower abdomen], it may radiate to lower back and thighs (Sutra et al., 2016). PD manifested by severe cramping or spasms in the pelvic and lumbar region, which may be accompanied by a variety of symptoms (Iacovides et al., 2015).

Regarding grade of dysmenorrhea according to WaLIDD total score the present study revealed that, there was no significant difference between studied groups before exercises. Moreover, WaLIDD total score reduced in aerobic group vs. control group.
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Emotional symptoms leading to decreased QOL. In the same line, Elbandrawy & Elhakk, (2021) in Egypt stated that, a significant difference in aerobic group was observed in MMDQ (p = .001). Results of current study supported by Rastogi et al., (2020) who found that aerobic exercise program was effective in the treatment of symptoms of primary dysmenorrhea. As well as, Patel et al., (2019) in India stated that, there was extremely significant difference in pain intensity & MMDQ with p value<.0001 . Eight domains of MMDQ showed significant improvement after eight weeks of intervention. Also, Tharani et al., (2018) found that, aerobic dance showed an effective option to reduce the pain and menstrual symptoms of PD and also helps to manage stress associated with menstrual cycle.

Finally, the present study suggested that pain and arousal domains of MMDQ were highly statistically significant independent positive predictors for VAS score. In addition, the results illustrate that pain, behavioral change, negative effect and arousal domains related to MMDQ were significant independent positive predictors for WaLIDD total scores.

Limitation of the Study
It was supposed to get a written informed consent from the studied subjects before participation in the study, but they were afraid of signing any paper. Accordingly, oral consent was obtained from them. The duration of data collection was delayed due to Covid_19 (Corona pandemic). All the protective measures were done to guard against corona pandemic such as; dividing the students in small groups, wearing masks,... Etc. The follow up process was done through phone calls & social media (Whatsapp, Messenger...Etc)

5. Conclusion
The current study results bring about the conclusion that:
Dysmenorrhea requires careful evaluation, as it may adversely affect the day to day activities and quality of life. Hence, aerobic exercises reduce intensity of primary dysmenorrhea and menstrual distress symptoms among female nursing students. Physical activities and exercises have been suggested to be an alternative treatment for primary dysmenorrhea.

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Declaration of Conflicting Interests
The author(s) declare(s) that there is no conflict of interest.

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