

## ORIGINAL ARTICLE

# Assessment of the Effectiveness of Aerobic Exercise Versus Billig's Exercise Among Nursing Students with Dysmenorrhoea in Selected Nursing Colleges in Bangalore

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### Abstract

**Introduction:** Dysmenorrhea afflicts millions of women all over the world and is considered the most common gynecological condition in women regardless of age and nationality. The notion that exercise is effective in preventing and treating symptoms has prevailed for many years and led to the promotion of anecdotal belief that exercise is beneficial. Behavioral interventions such as exercise may not only reduce dysmenorrhoea but also eliminate or reduce the need for medication to control menstrual cramps and other associated symptoms.

**Objectives:** 1. To assess the perceived levels of pain among dysmenorrhoeic students of Group-A and Group-B before intervention. 2. To assess the perceived levels of pain among dysmenorrhoeic students of Group-A and Group-B after intervention. 3. To evaluate the effectiveness of aerobic exercise in Group-A and Billig's exercise in Group-B. 4. To compare the effectiveness of aerobic exercise (Group-A) and Billig's exercise (Group-B) among nursing students with dysmenorrhoea. 5. To determine the association of the perceived levels of pain after intervention in aerobic exercise group (Group-A) and Billig's exercise group (Group-B) with their selected demographic variables.

**Methodology:** The design used in this study was true experimental, pre-test post-test research design. The selected settings for the study were nursing students of SJB and RajaRajeshwari College of Nursing, Bangalore. The total number of students at SJB College was around 180 and at RajaRajeswari College of Nursing was around 200. Among them, 85-95 students in each college were suffering with dysmenorrhoea. Investigator had selected 30 subjects using lottery method from each college. On Day-1, demographic questionnaire, checklist and numerical pain scale were used to collect the data. On the same day, aerobic exercise was taught for subjects in Group-A at SJB College of Nursing and Billig's exercise for Group-B subjects at RajaRajeswari College of Nursing using computer assisted instruction method. The phone numbers of participants were collected to maintain contact with them. Investigator maintained a record of their menstrual dates and contacted them over phone to remind and motivate them to do exercise during the time of menstruation. The post-test scores were collected once they attained the menstrual cycle and performed the exercise.

**Results:** The mean post test scores were calculated in each group and the 't' value was calculated. Since the computed 't' (5.6) was greater than 't' value  $t'_{(58)}=1.96$  at 0.05 level, it infers the post test score of aerobic

exercise group as 12.857 and that for Billig's exercise group as 12.26. Hence, it can be concluded that aerobic exercise was as effective as Billig's exercise.

**Conclusion:** Aerobic exercise and Billig's exercise can reduce pain in those suffering with dysmenorrhoea and are effective.

**Keywords:** Aerobic exercise, Billig's exercise, Nursing students, Dysmenorrhoea

## Introduction

"Movement is a medicine for creating change in a person's physical, emotional, and mental states - Carol Welch"

Almost a quarter of India's population comprises of girls below 20 years. One of the major physiological changes that take place in adolescent girls is the onset of menarche.<sup>1</sup> Exercise during menstruation has been shown to lessen the severity of menstrual pains such as stomach cramps. Not only will exercise help our brain release endorphins, a natural pain killer, but they will also help to stretch out muscles and increase blood flow.<sup>2</sup> Generally, light-to-moderate intensity activities that are sufficiently supported by aerobic metabolism can be performed for extended periods of time.<sup>3</sup> Aerobic exercise is physical exercise of relatively low intensity that depends primarily on the aerobic energy generating process. Walking is safe, it is simple and all it takes to get started is a good pair of walking shoes and a commitment to include aerobic exercise in our daily routine.<sup>4</sup> Billig's exercise is an exercise for dysmenorrhea, counteracting tendency to lordosis and stretching tight fasciae around the pelvis. It was published in 1943 by a Los Angeles orthopedic surgeon Harvey E. Billig Jr.<sup>5</sup>

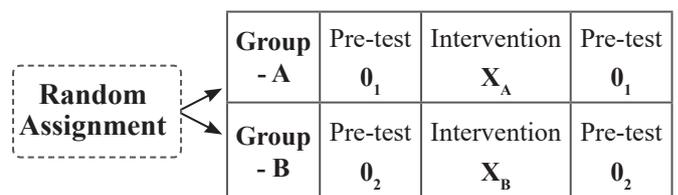
## Objectives

1. To assess the perceived levels of pain among dysmenorrhoeic students of Group-A and Group-B before intervention.
2. To assess the perceived levels of pain among dysmenorrhoeic students of Group-A and Group-B after intervention.
3. To evaluate the effectiveness of aerobic exercise in Group-A and Billig's exercise in Group-B.
4. To compare the effectiveness of aerobic exercise (Group-A) and Billig's exercise (Group-B) among nursing students with dysmenorrhea.
5. To determine the association of the perceived levels of pain after intervention with aerobic exercise in

Group-A and Billig's exercise in Group-B with their selected demographic variables.

## Materials and Methods

The research design used in the study was true experimental pre-test post-test research design.



## Description of the tool

**Section-I:** It consisted of demographic variables such as age, education, age at menarche, duration of menstrual period, menstrual cycle, number of pads/day, any family history of dysmenorrhoea.

**Section-II:** It consisted of - A) Parameters to assess the dysmenorrhoea by check list. B) Numerical pain scale.

**Scoring key:** Scoring key was prepared as described.

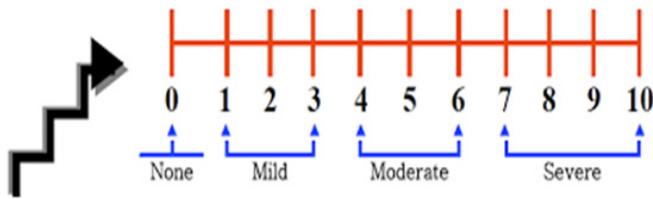
**Section-I.** By coding the demographic variables.

**Section-IIA.** Score 1 was awarded for each positive response and score 2 for each negative response. Total score allotted was 60 (Table 1). Parameters like (Gastro-intestinal symptoms, Elimination symptoms and others) were used to assess the level of pain among girls with dysmenorrhea.

**Keys: Section-IIB.** Score was given from 1-10 based on pain experienced each month (Figure 1).

**Table 1:** Score interpretation

Score Interpretation	Indicators
30-37	No pain
38-45	Mild
46-53	Moderate
54-60	Severe



**Figure 1:** Numerical Pain Scale

0- No pain

1-3- Mild pain

4-6- Moderate pain

7-10- Severe pain

### Data Collection Procedure

Formal permission was obtained from the principal of SJB College of Nursing and RajaRajeswari College of Nursing, Bangalore. The main study was conducted from 12.12.14 to 12.01.15. During this study period, subjects in Group-A were selected from SJB College of Nursing and those in Group-B were selected from RajaRajeswari College of Nursing. Prior consent and ethical clearance were obtained from the concerned authorities. According to inclusion criteria, a sampling frame was prepared. There were around 40-45 subjects in each college who had their menstrual cycle at the time of investigator's data collection. Among them, investigator had selected 30 subjects by using lottery method of simple random sampling. On Day-1, investigator introduced self, explained the purpose of the study and obtained informed consent from the subjects. The demographic questionnaire, checklist and numerical pain scale was used to collect the data. On the same day, aerobic exercise was taught for Group-A subjects at SJB College of Nursing and Billig's exercise was taught for Group-B subjects at RajaRajeswari College of Nursing using computer assisted instruction method. The phone numbers of participants were collected to maintain contact with them. Investigator maintained a record of their menstrual dates and contacted them over phone to remind and motivate them to do exercise during the time of menstruation. The post-test scores were recorded once they attained the menstrual cycle and performed the exercise. Frequency and percentage distribution was used to describe the demographic variables. Paired 't' test was used to compare two groups and Chi-square test was used to measure the difference between the observed value and the expected value.

## Results

### Section I: Distribution of baseline variables

The distribution of nursing students according to their age showed that 50% of the subjects of the aerobic exercise group belonged to the age group 17-19 years, which was higher compared to Billig's exercise group. About 60% of the subjects of Billig's exercise group belonged to the age group of 20-22 years and this was higher than 44% observed in aerobic exercise group. However, 6% subjects of both aerobic and Billig's exercise group belonged to the age group of 23-25 years.

In relation to the educational status, 34% of participants in the aerobic exercise group were from the first year, and this was higher compared to 27% in Billig's exercise group. 27% of subjects in Billig's exercise group were from the second year which was slightly higher than the 23% in aerobic exercise group. 23% of respondents of both aerobic exercise and Billig's exercise groups were from third year and 20% subjects of aerobic exercise group were from the fourth year which was slightly lower compared to 23% of Billig's exercise group.

Distribution of respondents according to their age at menarche showed that the majority i.e. 94% of Billig's exercise group subjects attained menarche at around 10-15 years which was slightly higher than that of 87% in aerobic exercise group. Only 3% of respondents in Billig's exercise group attained menarche at <10 years of age. About 13% of respondents in aerobic exercise group attained menarche at >15 years which was very high compared to 3% found in Billig's exercise group.

Regarding the distribution of participants according to the duration of menstruation, majority i.e., 56% of the respondents in Billig's exercise group experienced menstruation for 5-6 days which was slightly higher than the participants in aerobic exercise group (50%). 34% of respondents in both the groups had menstruation for 3-4 days. 16% of respondents in aerobic exercise group had menstruation for 7-8 days as compared to 10% in Billig's exercise group.

In relation to the menstrual cycle, it was observed that 27% of respondents in Billig's exercise group had a menstrual cycle of <28 days as compared to 20% of respondents in the aerobic exercise group. Around 60% of the respondents from aerobic exercise group had a menstrual cycle of 28-32 days as compared to 43% in Billig's exercise group. 20% of the aerobic exercise

group subjects had a menstrual cycle of >32 days as compared to 30% in Billig's exercise group.

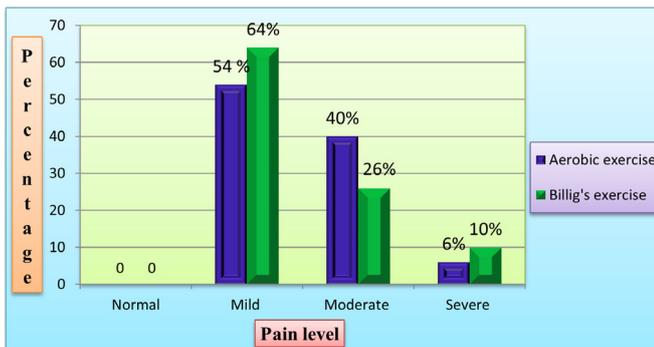
The distribution of respondents according to the number of pads/day showed that 68% of respondents of aerobic exercise group used 2-4 pads/day as compared to 50% in Billig's exercise group. 34% of Billig's exercise group subjects used 4-6 pads/day which was higher compared to 16% of aerobic group respondents. However, 16% of both aerobic exercise and Billig's exercise group respondents used 6-8 pads/day.

Regarding the family history of dysmenorrhea, majority i.e., 77% of respondents of the aerobic exercise group and 73% of respondents of Billig's exercise group had no family history of dysmenorrhoea. 23% of respondents of the aerobic exercise group and 27% participants of Billig's exercise group had a family history of dysmenorrhea.

## Section II: Distribution of parameters to assess the perceived levels of pain among girls with dysmenorrhoea of Group-A (Aerobic Exercise) and Group B (Billig's Exercise)

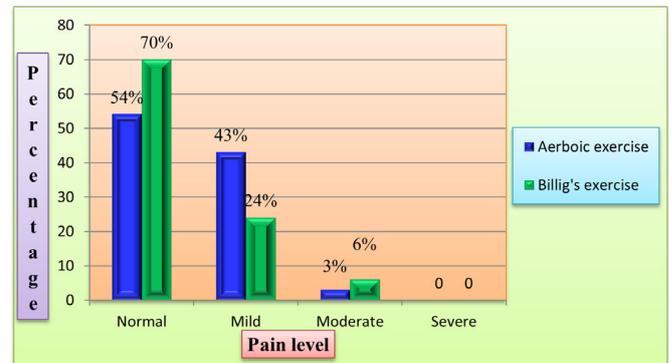
In this study, the perceived level of pain among girls with dysmenorrhea was assessed using the modified checklist and the numerical checklist.

### A: Distribution of respondents according to the modified checklist



**Figure 1:** Percentage of pre-test pain of respondents assessed by modified checklist

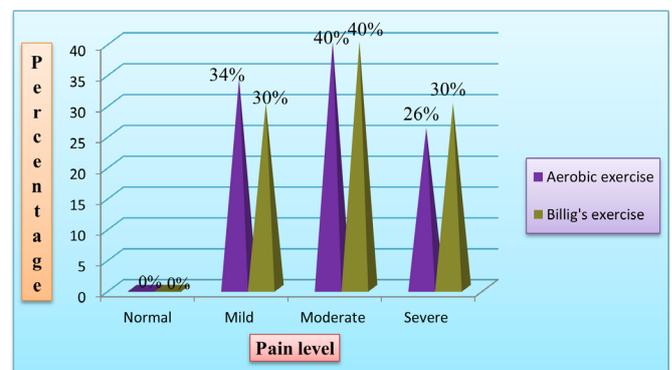
Figure 1 reveals the pre-test pain level scores of participants in aerobic exercise and Billig's exercise groups. The findings of the study indicate that 64% of Billig's exercise group subjects had mild pain which was higher than 54% reported in aerobic exercise group. 40% of the aerobic exercise group subjects had moderate pain compared to 26% of Billig's exercise group subjects and 10% of Billig's exercise group subjects had moderate pain which was higher than 6% observed in aerobic exercise group.



**Figure 2:** Percentage of post-test pain of respondents assessed by modified checklist

The above figure (Figure 2) depicts the respondent's post-test pain level checklist in both aerobic exercise and Billig's exercise groups. The findings of the study indicate that 70% of Billig's exercise group subjects had normal pain which was higher than that observed in 54% of aerobic exercise group subjects. 43% of the aerobic exercise group subjects had mild pain as compared to 24% of Billig's exercise group subjects and 6% of Billig's exercise group subjects had moderate pain which was higher than aerobic exercise group (3%). However, none of the respondents reported severe pain during the post-test study as assessed by checklist.

### B. Distribution of respondents according to the numerical pain scale



**Figure 3:** Percentage of pretest pain level according to numerical scale

The above figure depicts that in pre-test, the majority i.e., 40% of respondents had moderate pain levels in both exercise groups. 34% of aerobic and 30% of Billig's exercise group subjects had mild pain, while 26% of aerobic and 30% of Billig's exercise group subjects had severe pain during pre-test as assessed by numerical scale. None of the respondents felt normal pain during the pre-test.

The numerical rating scale of respondent's pre-test pain levels showed that 50% of respondents of Billig's exercise group had normal pain levels which was higher

than the 43% in aerobic exercise group. 37% of the aerobic exercise group subjects and 37% of Billig’s exercise group subjects had mild pain and 20% of aerobic exercise and 13% of Billig’s exercise group subjects had moderate pain. However, none of the respondents reported severe pain during the pretest.

With respect to posttest pain levels, the numerical rating scale showed that 50% of respondents of Billig’s exercise group had normal pain levels which was higher than 43% in the aerobic exercise group. 37% of both the aerobic exercise group and 37% of Billig’s exercise group subjects had mild pain and 20% of aerobic exercise and 13% of Billig’s exercise group subjects had moderate pain. However, none of the respondents reported severe pain during the posttest.

**Section III: Comparison of the effectiveness of aerobic exercise and Billig’s exercise method (n=60)**

Group	Mean	Mean difference	SD	df	‘t’ value
Group-A (Aerobic exercise) n=30	36.73	7.2	3.08	29	Calculated ‘t’ <sub>A</sub> ’= 12.857 ‘t’ <sub>B</sub> ’=12.26 df=58  p>0.05 Table value ‘t’=1.96
Group-B (Billig’s exercise) n=30	35.16	8.84	5.47	29	

Since the calculated’ value ‘t’<sub>A</sub>’=12.85 and ‘t’<sub>B</sub>’=12.26 was more than the tabulated ‘t’=1.96 value, the data indicates that aerobic exercise and Billig’s exercise were effective in reducing pain. Hence it can be concluded that aerobic exercise as well as Billig’s exercise were effective in reducing pain in subjects suffering from dysmenorrhoea. Thus, the null hypothesis was rejected and the research hypothesis was accepted.

**Section IV: Association of parameters of dysmenorrheal checklist of Group-A after intervention and their selected demographic variables**

In relation to age in years, and education, the Chi-square value obtained was 7.25, 8.20 respectively, which showed a statistically significant association at *p* <0.05. Hence the research hypothesis was accepted.

In relation to variables, age at menarche, duration of menarche, menstrual cycle, number of pads per day

and family history of dysmenorrhoea, the Chi-square values obtained were 1.47, 1.3, 4.08, 1.33, and 0.76, respectively which did not show any association with the pain levels.

**Section V: Association of parameters of dysmenorrheal checklist of Group-B after intervention and their selected demographic variables**

In relation to age in years and education, the Chi-square value obtained was 7.08, 8.98 respectively, which showed a statistically significant association at *p* <0.05. Hence the research hypothesis was accepted.

In relation to variables, age at menarche, duration of menarche, menstrual cycle, number of pads per day, and family history of dysmenorrhoea, the Chi-square values obtained were 4.34, 0.89, 3.89, 1.68, 1.95, and 0.77, respectively which did not show any association with the pain levels.

**Discussion**

The present study was designed to assess the effectiveness of aerobic exercise versus Billig’s exercise among nursing students with dysmenorrhoea in selected nursing colleges in Bangalore. The data findings have been organized in the discussion based on the study objectives.

**Section I:**

**A: To assess the perceived levels of pain among dysmenorrhoeic students of Group-A and Group B before intervention**

The mean of pre-test scores during menstruation in aerobic exercise group assessed by the modified checklist was found to be 43.93. Similarly, the mean pre-test score in Billig’s exercise group was found to be 44. The analysis of pre-test pain level scores in aerobic exercise and Billig’s exercise groups indicate that 64% subjects in Billig’s exercise group had mild pain which was higher compared to 54% subjects with mild pain in aerobic exercise group. 40% subjects in aerobic exercise group showed moderate pain compared to 26% subjects in Billig’s exercise group. 10% subjects in Billig’s exercise reported moderate pain which was higher than 6% subjects in aerobic exercise group. Similar findings were reported in a quasi-experimental study that was conducted by Samadi Z involving non-athlete girl students where the mean scores of pre-menstrual syndromes, during and after exercise were different (*p* ≤0.001), and the percentages of scores (*p* ≤0.001) after eight weeks of training. The findings showed that

exercise is effective in reducing the symptoms of Pre-menstrual syndrome and can be used as a treatment.<sup>6</sup>

### **B: To assess the perceived levels of pain among dysmenorrhoeic students of Group A and Group B after the intervention**

The mean score of pain levels assessed by the modified checklist was 36.73. Similarly, the mean score observed in Billig's exercise group was 35.16. Regarding the level of pain, after the intervention, modified checklist scores revealed that 70% of Billig's exercise group subjects reported normal pain which was higher compared to 54% in aerobic exercise group. 43% subjects in aerobic exercise group had mild pain as compared to 24% subjects in Billig's exercise group. Around 6% subjects in Billig's exercise group reported experiencing moderate pain which was slightly higher compared to 3% in aerobic exercise group. However, none of the respondents reported severe pain during the posttest study as assessed by the checklist. This finding is consistent with the findings of study done by Shahrjerdy S which was conducted on primary dysmenorrhea among single girls at the University of Arak, Iran. The results showed that stretching exercises were effective in reducing pain intensity and pain duration in girls with primary dysmenorrhea.<sup>7</sup>

### **Section II: To evaluate the effectiveness of aerobic exercise in Group-A and Billig's exercise in Group-B**

The mean post-test score for Group-A was 36.73 and in Group B was 35.16. It shows that the post-test scores were similar in Group-A and Group B. Hence it is concluded that aerobic exercise was as effective as Billig's exercise. Since the computed 't' (5.6) is greater than 't' value 't' (58) =1.96 at 0.05 level, it infers the post-test score of aerobic exercise group as 12.857 and that for Billig's exercise group as 12.26. Hence, it can be concluded that aerobic exercise is as effective as Billig's exercise.

These findings of the present study can be supported by the findings of an evaluative study conducted on the effectiveness of Billig's exercise in the reduction of pain in selected colleges in Bangalore. The findings showed that Billig's exercise was effective in reducing pain and can be used in practices during menstruation.<sup>8</sup>

### **Section III: To compare the effectiveness between aerobic exercise (Group-A) and Billig's exercise (Group B) among nursing students with dysmenorrhea**

The mean post-test score for Group-A was 36.73 and that for Group B was 35.16. It showed that the post-test scores of Group-A were almost same as that of group B. Hence it was concluded that aerobic exercise is as effective as Billig's exercise. Since the computed 't' (5.6) is greater than 't' value 't' (58) =1.96 at 0.05 level, it infers that there is a similar significant difference between the post-test scores of both the groups. Thus, it can be stated that aerobic exercise is as effective as Billig's exercise. The findings of the study are supported by findings of Gangane P who reported that aerobic exercises showed better improvement in terms of pain reduction and reducing symptoms of primary dysmenorrhea as compared to Golub's exercises in high school girls of Belgaum city.<sup>9</sup>

### **Section IV: To determine the association of perceived levels of pain after intervention in aerobic exercise group (Group-A) and Billig's exercise group (Group-B) with their selected demographic variables**

Chi-square test used to determine the association between the pain level scores in the aerobic exercise group and selected demographic variables showed a significant association between the pain level in the aerobic exercise group subjects and selected demographic variables like age in years and education. Hence the research hypothesis was accepted. A similar study was conducted on the effectiveness of low-intensity exercise to determine the association between discomfort and selected variables among adolescent girls in Mangalore. It was concluded that there was a significant difference between the discomfort in the experimental and control groups. Study findings revealed an association between discomfort and the variable gender. The findings of the study revealed that majority of the girls had mild or no discomfort. The study concluded that low-intensity exercise is an effective method to improve balance among adolescents.<sup>10</sup>

## **Conclusion**

This chapter deals with the conclusion, implications for nursing practice, nursing education, nursing administration, nursing research, recommendations and suggestions.

The following conclusions were drawn based on the findings of the study:

- ❖ All the nursing students having dysmenorrhoea experienced pain during menstruation.
- ❖ Majority of the subjects were first year nursing students.

- ❖ All the participants in both the groups performed exercise during the time of menstruation.
- ❖ The post-test findings of aerobic exercise and Billig's exercise showed significant difference in pain levels in those suffering with dysmenorrhoea.
- ❖ There was a significant association between the effectiveness of aerobic exercise and selected demographic variables like age in years and education among nursing students having dysmenorrhoea.
- ❖ There was a significant association between the effectiveness of Billig's exercise among nursing students having dysmenorrhoea with their selected demographic variables like age in years and education.

### Implications of the study

The findings of the present study have implications in the field of nursing education, nursing practice, nursing administration and nursing research.

### Nursing Education

- ❖ Make use of available literature and studies related to exercises for those with dysmenorrhoea.
- ❖ Educate the nursing students about aerobic exercise and Billig's exercise for pain relieving in dysmenorrhoea.
- ❖ Nurses may be given chance to teach aerobic exercise as well as Billig's exercise for students suffering from dysmenorrhoea to reduce the pain levels.
- ❖ Encourage students for effective utilization of research-based practice.
- ❖ Continuing nursing education programs can be organized for nurse educator to help them implement alternative techniques for exercises among students.

### Nursing Practice

- ❖ Implementing the exercise during menstruation will be beneficial for the nursing students having dysmenorrhoea.
- ❖ Nurse educator plays an important role in initiating exercise among students.

### Nursing Administration

- ❖ Collaborate with governing bodies to formulate standard policies and protocols to emphasis exercise for dysmenorrhoea.
- ❖ Arrange and conduct workshops, conferences, and in service education programs regarding aerobic

exercise, Billig's exercise and other strength training exercises for dysmenorrhoea.

- ❖ Provide opportunities for nurse administrator to conduct training programs on various pain-relieving exercises.
- ❖ Nurse administrator can use this strategy for better quality care among nursing students with dysmenorrhoea.

### Nursing Research

- ❖ Research can promote many studies on this topic among various nursing students.
- ❖ Promote effective utilization of research findings on pain relieving exercises.
- ❖ The nurses can be motivated by nurse educators and administrators to conduct research on various pain-relieving exercises, incorporating various outcome measures.

### Suggestions

- ❖ Nursing administrators can organize workshops and in service education programs regarding aerobic exercise and other methods of pain-relieving exercises.
- ❖ Implementing exercise regimen during menstruation could be beneficial for students with dysmenorrhoea.
- ❖ Nurses can play a major role in reducing pain during dysmenorrhoea by motivating the students to implement exercise.

### Recommendations

Based on the findings of the study the following recommendations are offered for the future research.

- The findings can be replicated on a larger sample and other settings.
- A similar studies can be conducted on dysmenorrhoea involving other strength training exercises.
- A comparative study can be conducted on effectiveness of various exercises among students having dysmenorrhoea.

### Conflict of interest

None

### Acknowledgements

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