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Effectiveness of Billig's Exercise on Reduction of Dysmenorrhea among Adolescent Girls

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ABSTRACT

Background: Dysmenorrhea refers to uncomfortable menstruation. Billig's exercises are quite beneficial for the treatment of menstruation disorders. Considering insufficient information on dysmenorrhea in Bagalkot district, the present study aimed to identify the effectiveness of Billig's exercise on the reduction of dysmenorrhea among adolescent girls.

Methods: This study used a true experimental pre-test-post-test control group design using an experimental method, a subtype of a quantitative approach. Using purposive sampling procedures, a non-probability sampling technique, 60 teenage girls with dysmenorrhea were recruited for the study; 30 were assigned to the experimental group and 30 to the control group. In both groups of teenage females, the degree of menstruation pain was measured using the Numerical Pain Intensity Scale. Descriptive as well as inferential statistics were used to analyze data.

Results: Both inferential and descriptive statistics were used to analyze the data. In the experimental and control groups, the pre-test values for menstrual pain in adolescent girls were 6.27 and 6.53, respectively. The experimental and control groups had mean post-test scores of 2.60 and 3.5, respectively. Two groups were compared and correlated using the independent 't' test (t=25.87) and Mann Whitney's U test (U=723).

Conclusion: The study found that Billig's exercise is beneficial in relieving menstruation discomfort in adolescent girls.

Key-words: Adolescent girls, Billig's exercise, Demographic variables, Dysmenorrhea, Menstrual pain

INTRODUCTION

Health is the foundation for a happy, fulfilled life. Change may make life more beautiful and worthwhile if one understands how to adapt and adjust to the problems that arise. Puberty is a stage in the lives of all women that occurs between the ages of 10 and 15 years.

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Adolescence is when a woman demonstrates her potential to bear children [1]. Adolescence is a stage of life transitioning from childhood to adulthood characterized by rapid changes in hormonal, mental, emotional, and physical characteristics.

A girl's physical and mental preparation for a healthy pregnancy happens during adolescence. Since adolescent girls are the primary reproducers, their health affects not only them personally but also the health of future generations. Approximately 25% of the Indian population comprises girls under 20 [2]. The female reproductive cycle includes the menstrual cycle, which is significant. More than any other age group, young adult female students experience stress. The many forms of stress and

severity are related to their jobs, education, social status, and financial situation. As a result, individuals are more likely to experience menstrual issues [3]. However, menstruation issues are frequent among adolescent girls, with a prevalence rate of roughly 50%. Dysmenorrhea, premenstrual syndrome, irregular uterine bleeding, and amenorrhea are among the issues [4]. Many women today consider exercise to be an essential component of their daily lives.

There are numerous health benefits for women who exercise frequently and moderately. Exercise improves cardiovascular health, increases bone mineral content, and relieves dysmenorrhea and premenstrual syndrome symptoms. Given the negative effects of pharmacological therapies and surgery, non-drug treatments, particularly physical activity, have piqued the interest of both professionals and women. It also aids in pain reduction, stress relief, mood elevation, and overall health improvement. Women, who exercise had less severe dysmenorrhea and more favourable benefits than those who are sedentary [5].

Dysmenorrhea is the Greek name for unpleasant menstrual bleeding. There are two types of dysmenorrhea: primary and secondary. It's a typical complaint among women in their reproductive years. The management and treatment of dysmenorrhea include both pharmaceutical and non-pharmacological treatments [6]. Dysmenorrhea has been related with a significant influence on women's daily lives. Absenteeism rates at school and work reflect this influence. It may also limit women's engagement in sports and social activities [7].

As a non-medical treatment for dysmenorrhea, physical activity has been suggested. One of the earliest advocates of exercise as a dysmenorrhea treatment was Billig in 1943. Hip flexors, inner thigh muscles, and the connective tissue encircling the pelvis are all stretched throughout the Billig exercise routine. Exercise has several benefits, including reducing psychological stress, improving blood circulation, and relieving pain. It also helps to increase physical strength and endurance [8]. These exercises never established conventional treatment, but the assumption that they were effective remained widely accepted despite the data being primarily anecdotal. Daily, we can perform any exercise, such as basic running, skipping, walking, and breathing [9].

Complications from dysmenorrhea can be classified according to how much the discomfort interferes with the woman's everyday activities and general well-being. There are no known effects of primary dysmenorrhea because it is not linked to any illness or disease. Depending on the cause, secondary dysmenorrhea consequences can vary. Possible consequences include anaemia, heavy bleeding, pelvic organ prolapse, and infertility [10].

The World Health Organization (WHO), the US National Institute of Health (NIH), and other respectable organizations, such as primary dysmenorrhea, have all confirmed its safety. Endorphin production or hormonal alterations in the uterine epithelial tissues may be the cause of dysmenorrhea in women who exercise frequently. Exercise has been shown to enhance the production of endorphin hormones in the brain, improving mood and increasing pain threshold [11].

We attempted to provide cross-sectional data on the prevalence and predictors of dysmenorrhea in a few selected rural areas of Bagalkot district, as well as the necessary reference data on dysmenorrhea predictive factors to guide its prevention and control strategies in this district, given the lack of information on dysmenorrhea in the district and the possibility that individual studies may lack statistical power due to sample size.

MATERIALS AND METHODS

The current study employs a true experimental pre-test, post-test control group design. A sample of 60 adolescent girls was drawn from the BVVS High School Bagalkot. Participants provided written consent for the study. Data collection tools included socio-demographic variables, clinical features, and the Numeric Pain Rating Scale. The data was analyzed using descriptive and inferential statistical methods such as mean, frequency, distribution, percentage, chi-square, and Mann-Whitney's U test.

Study design- This study utilized a true experimental pre-test-post-test control group design. The experimental and control groups of adolescent girls were chosen randomly.

Setting of the study- The present study was conducted at Bagalkot's BVVS High School. The study location was

chosen based on the availability of adolescent girls at BVVS High School in Bagalkot.

Participants- The current study included adolescent girls aged 12 to 16 years. The sample included 60 adolescent girls with dysmenorrhea. There are 30 in each of the experimental and control groups.

Instruments- The study included standardized questionnaires relating to adolescent girls' socio-demographic and personal characteristics, as well as a numerical rating pain scale to determine the severity of dysmenorrhea.

Data collection procedures- The major study occurred at BVVS High School in Bagalkot, Karnataka, India, from June 20 to July 15, 2023. The relevant authority granted formal approval, and the subjects gave their consent. The structured questionnaire was utilized for the pre-test, and the Numeric pain scale was used to determine the level of pain among adolescent girls on the day before their period, as well as on days one and two of the uterine cycle. The post-test was administered to both groups on the next menstrual cycle after the intervention using the same scales.

The variable under study- The study variables for the present study were Billig's exercise, dysmenorrhea, and coping strategies of adolescent girls.

Socio-demographic variables- Age, education, religion, type of family, parents' occupation, family monthly income, dietary pattern, menstrual history, age at menarche, duration of menstruation, frequency of menstruation, duration of menstruation, nature of menstrual flow, and length of cycle.

Statistical Analysis- The collected data regarding the study's objectives using inductive statistics was statistically analysed. A master sheet was created using the replies provided by study participants. The demographic data was analyzed using percentages and frequencies, the Chi-square (x^2) test was used to ascertain the relationship between socio-demographic variables and adolescent girls' post-test pain levels, and the paired t-test/Mann Whitney U test was used to assess the significance of the difference between pre- and post-test pain scores.

Ethical Approval- Written consent was collected from each participant, and an ethical approval certificate was received from the Institution's ethics committee.

RESULTS

In this study, most adolescents (66%) in the experimental group and 66% in the control group were 12-13 years old. They were in the 8th standard, followed by 50% in the experimental group and 43% of adolescent girls in the control group in the 9th standard, 86% have Hindu religion, and 70% of adolescent girls have nuclear family in both the groups, their educational status of the father shows that the majority (63.3%) of fathers of adolescent girls in experimental group and 63.3% in control group were SSLC & above, their educational status of mother is 83% in experimental group and 50% in control and family monthly income is 76% 5000 to 10000 in both the group, 55% has belongs to mixed dietary pattern, and place of residence is 93% urban area. There is no family history of dysmenorrhea; 93% of adolescent girls have not taken any medical assistance for dysmenorrhea.

In the present study, adolescent girls, according to their onset of dysmenorrhea during menstruation, showed that 43.3% of subjects in the experimental group and 63.3% in the control group had onset of dysmenorrhea on their first menarche, where the distribution of menstrual flow in experimental group 60% and 46.6% of the sample in the control group had more than 6 days of menstrual flow, 63.3% of the sample in the experimental group and 60% of the sample in the control group had dysmenorrhea 1st day onwards. Their history of symptoms of dysmenorrhea showed that 66.6% of adolescent girls in the experimental group and 40% of adolescent girls in the control group had back pain, and the natural flow of menstruation was 73% in the experimental and 70% in the control group. 53.3% of adolescent girls in the experimental group and 26.6% of adolescent girls had <21 days of length of cycle, and the nature of menstrual pain is 50% of adolescent girls in the experimental group, and 56.6% of adolescent girls had cramping, 50% adolescent girls in the experimental group and 63.3% of adolescent girls in the control group never had disturbances during menstruation, where 33.3% of adolescent girls in experimental group and

46.6% of adolescent girls of control group had managed dysmenorrhea by themself, 100% of sample in experimental group and 93.3% of sample in control group had not taken any measures to control dysmenorrhea, and 50% of adolescent girls of control group age at menarche 12-13 years (Table 1).

Table 1: Pre-test mean and SD of pain among adolescent girls in experimental and control groups

Variable	Group	Mean	SD
Pain	Experimental group	6.27	1.46
	Control group	6.53	1.5

SD=Standard deviation

The data was tested for normality and found not normally distributed; hence, Mann-Whitney's U test was used to determine the significance of the difference between the pain level between the experimental and control groups (Table 2). The Mann Whitney's U value (U=723) suggests that the pain during dysmenorrhea in adolescent girls of the experimental group who received the intervention of Billig's exercise was significantly ($p<0.01$) reduced as compared to pain during dysmenorrhea in adolescent girls of the control group who did not receive any intervention. Hence, the intervention of Billig's exercise had a significant effect on reducing pain during dysmenorrhea among adolescent girls. Thus, it is concluded that the administration of Billig's exercise intervention has decreased the level of pain effectively among adolescent girls.

Table 2: Effectiveness of Billig's exercise on pain among adolescent girls in both groups.

Group	Test	Mean	SD	Mean rank	Mann Whitney U	Z value	p-value
Experimental group	Pre-test	6.27	1.46	39.6	723	4.03	0.0001*
	Post-test	2.06	0.98				
Control group	Pre-test	6.53	1.5	21.4			
	Post-test	3.5	1.10				

**Significant=p<0.01, SD=Standard deviation*

The computed chi-square values for the age, education, religion, family type, father and mother's educational status, and other socio-demographic factors of adolescent girls are displayed in Table 3. With a 2×2 contingency table and 1 degree of freedom, the chi-square table value for all the socio-demographic variables is 3.85. As a result, the computed chi-square value of the socio-demographic variable was lower than the value in the chi-square table. This suggests that the pre-test score for dysmenorrhea and those above chosen socio-demographic variables did not significantly correlate ($p>0.05$).

The estimated chi-square value for the socio-demographic variables, such as the father's educational status and occupation, was 5.96 and 4.04. The chi-square calculated value is greater than the chi-square table value. There was a strong correlation ($p<0.05$) between the father's educational status and occupation and his pre-test score for Billig's exercise.

Table 3: Association between pre-test scores of billings exercises with selected demographic variables

Socio-demographic variables	Chi-square value	p-value
Age (year)	1.16	0.28**
Education	0.08	0.78**
Religion	2.91	0.09**
Type of family	0.58	0.45**
Education status of father	5.96	0.01*
Education status of mother	0.41	0.52**
Family monthly income	0.03	0.87**
Occupation of father	4.04	0.04*
Occupation of mother	0.56	0.46**

Dietary pattern	1.98	0.16**
Place of residence	1.36	0.24**
Family history of dysmenorrhea	0.01	0.91**
Are you taking any medical assistance for dysmenorrhea	2.33	0.13**
Do your physical exercises	3.76	0.05**

*=Significant;**=Not significant; Degree of freedom (DF) =1; Table value=3.84

Table 4 shows the calculated chi-square values for the clinical characteristics variables of adolescent girls, such as the onset of dysmenorrhea, duration of menstrual flow, symptoms during menstruation, the flow of menstruation, age at menarche, and measures to control pain. The chi-square table value for all the clinical characteristics variables with a 2×2 contingency table and a degree of freedom 1 is 3.85. Hence, the calculated chi-square value for the clinical characteristics variable like duration of menstrual flow, when having dysmenorrhea, nature of menstrual pain, and age at menarche is lesser than the chi-square table value. This indicates no significant association between the above-selected clinical characteristics variables with pre-test dysmenorrhea score ($p>0.05$).

The calculated chi-square value for the clinical characteristics variable like Onset of dysmenorrhea, What symptoms you feel during menstruation, Nature flow of menstruation, and length of the cycle was higher than the chi-square table value (3.85). This indicates a significant association between the clinical characteristics variables and pre-test dysmenorrhea score ($p<0.05$).

Table 4: Association between pre-test scores of Billig's exercises with clinical characteristics.

Clinical characteristics	Chi-square value	p-value
Onset of dysmenorrhea	4.98	0.03*
duration of menstrual flow	0.41	0.52**
When do you have dysmenorrhea	0.33	0.56**
What symptom do you feel during menstruation	8.52	0.003*
Nature flow of menstruation	4.75	0.03*
Length of cycle	8.62	0.003*
Nature of menstrual pain	2.22	0.14**
Psychological disturbances during menstruation.	3.28	0.70**
What action you will take for dysmenorrhea during class hours	0.43	0.51**
Have to take any measures to control pain.	0.33	0.56**
Age at menarche	2.80	0.09**

*=Significant;**=Not significant; Degree of freedom (DF) =1; Table value=3.84

DISCUSSION

The present study was undertaken to determine the efficiency of Billig's exercise in reducing dysmenorrhea among adolescent females attending BVVS High School Bagalkot, Karnataka. An experimental pre-test-post-test control group design was adopted to meet the study's objectives. The study's sample consists of 60 adolescent females with dysmenorrhea, 30 in the experimental group and 30 in the control group, recruited using purposive sampling procedures, a non-probability sampling approach.

The finding of the present study shows that the level of pain among adolescent girls in the experimental group depicts that most (60%) were in moderate pain, 40% were in severe pain, and similarly, in the control group, most adolescent girls (66%) were in the moderate pain, 44% were in the severe pain.

The assessment of adolescent girls' mean, SD and mean percentage of pre-test pain scores reveals that the total mean percentage of pre-test pain scores was 30% with mean and SD of 6.27±1.46.

The comparison of pre-test and post-test pain scores of adolescent females in the experimental group reveals that, at the pre-test, the majority (52%) of adolescent girls experienced moderate pain. After the test, the majority of the adolescent girls (88%) reported minor pain. Whereas in the control group, the majority of adolescent girls (80%) reported moderate pain before the test. After the test, most adolescent girls (98%) reported moderate pain.

A comparison of the mean percentage of pain scores of adolescent girls in the experimental group in the pre-test and post-test shows a 26.04% drop in the mean pain

scores of the adolescent girls following the administration of Billig's exercise. In the control group, the mean pain scores of the adolescent females decreased by 10.57% following the delivery of Billig's exercise.

The current study's findings are consistent with and supported by the study conducted at Sri Guru Ram Das College of Nursing in Vallah. The study discovered that the average pain score and standard deviation were 5.58±1.45 before intervention and 4.88±1.10 after. A paired t-test was used to examine effectiveness, yielding a t-value of 7.52 and statistically significant results [15].

The post-test pain levels of experimental and control group adolescent girls showed a statistically significant difference. The Mann-Whitney test ($U=723$, $p<0.01$) found that discomfort during dysmenorrhea was significantly reduced among adolescent females in the control group who did not receive any intervention. As a result, Billig's exercise intervention was effective in lowering discomfort during dysmenorrhea in adolescent girls.

The current findings were similar to the prior randomized clinical trial. The participants were 60 female college students separated into "exercise" and "control" groups. The exercise intervention resulted in a substantial decrease in VAS scores across three visits ($p<0.05$) [16].

The results of the previous experiment were similar in terms of the relationship between pre-test scores of Billig's exercises and selected demographic factors. The study was conducted at a designated Government Girls Higher Secondary School in Madurai, using a one-group pre-test-post-test design. Billig's exercise was utilized as an intervention in this study and was practised twice daily for six days per week until the next period. This study demonstrates that Billig's exercise significantly reduces dysmenorrhea in adolescent females [17].

The results of the association between pre-test Billig's exercise scores and clinical features were comparable to a previous randomized controlled study (RCT) (double-blinded) conducted at the Royal Group of Colleges in Gujranwala. Each group showed significant changes in pain and related symptoms ($p<0.01$). However, both groups do not differ significantly from one another ($p>0.05$) [18].

LIMITATIONS

The study was limited to a small sample size of 60 teenage girls aged 12 to 16. The study was conducted in a specific educational environment, BVVS High Educational in Bagalkot, which may restrict the findings' generalizability to other settings. Furthermore, the study should have revealed information about the long-term benefits of Billig's exercise on dysmenorrhea.

CONCLUSIONS

The study discovered that Billig's exercise intervention program was successful in relieving menstruation pain in adolescent girls with dysmenorrhea. The administration of Billig's exercise was proven to be a scientific, logical, and cost-effective strategy for managing dysmenorrhea in the studied population. Further research is needed to explore the potential benefits of combining Billig's exercise with other interventions or treatments for dysmenorrhea to enhance its effectiveness. Also, larger-scale studies with a more diverse sample are required to increase the generalizability of the findings.

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CONTRIBUTION OF AUTHORS

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