



EFFECTIVENESS OF BEETROOT JUICE IN REDUCING DYSMENORRHOIC SYMPTOMS AMONG NURSING STUDENTS: A PRE-EXPERIMENTAL ONE-GROUP PRETEST-POSTTEST STUDY

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ABSTRACT **Background:** Dysmenorrhoea is a common cause of menstrual pain and disruption of academic and daily activities. Low-cost dietary approaches may offer useful complementary options. Beetroot (*Beta vulgaris*) contains inorganic nitrates, betalains and antioxidant compounds that provide a plausible physiological basis for investigation. **Objective:** To assess dysmenorrhic symptoms among nursing students and evaluate the effect of 50 mL/day freshly prepared beetroot juice on physical, physiological and psychological symptoms. **Methods:** A quantitative pre-experimental one-group pretest–posttest design was conducted among 34 first-year B.Sc Nursing students selected by convenience sampling from a selected college of nursing in Coimbatore, Tamil Nadu, India. A structured, expert-validated questionnaire assessed menstrual characteristics and 35 dysmenorrhic symptoms using dichotomous scoring (0–35). Beetroot juice was administered daily for one menstrual cycle, followed by posttest assessment. Descriptive statistics and a paired t-test were used. **Results:** Physical, physiological and psychological symptom frequencies declined after intervention. Exhaustion/lethargy decreased from 28 to 15 students, abdominal cramps from 26 to 11, and backache from 28 to 12. Weakness decreased from 26 to 11 and painful breasts from 26 to 13. Irritability decreased from 27 to 15 and insomnia from 23 to 10. The mean total symptom score declined from 15.05 to 8.41, a reduction of 6.64 points (paired $t = 16.03$, $df = 33$, $p < 0.05$). Severe and very severe pain also became less frequent. **Conclusion:** In this cohort, one cycle of beetroot juice was associated with significant improvement in self-reported dysmenorrhic symptoms. Because the study lacked a control group and used a small convenience sample, the findings should be considered preliminary and confirmed through controlled trials.

KEYWORDS : Dysmenorrhoea; Beetroot Juice; Nursing Students; Menstrual Symptoms; Complementary Therapy; Pretest–Posttest Design

1. INTRODUCTION

Dysmenorrhoea is painful cramping in the lower abdomen occurring shortly before or during menstruation and is among the most common gynaecological complaints in women. Menstrual disorders during adolescence and early adulthood may cause considerable physical and psychological distress and can interfere with education, clinical training, daily activities and quality of life [1–5]. Primary dysmenorrhoea is commonly associated with increased endometrial prostaglandin production, resulting in uterine contraction, reduced uterine blood flow and pain sensitisation [4].

Non-steroidal anti-inflammatory drugs are effective for menstrual pain, but some students may prefer dietary or complementary approaches because of accessibility, personal preference or concerns about repeated medication use [6]. Beetroot (*Beta vulgaris*) is rich in inorganic nitrates, betalains and antioxidant compounds. Nitrate metabolism contributes to nitric-oxide production and vasodilation, while beetroot phytochemicals have potential antioxidant and anti-inflammatory effects. These properties provide a plausible rationale for investigating beetroot juice as a dietary adjunct for dysmenorrhoea, although a direct clinical effect on menstrual symptoms cannot be assumed without controlled evidence [7].

Nursing students are an important population for study because menstrual symptoms may affect attendance, concentration, clinical placement and academic performance. The present study therefore assessed dysmenorrhic symptoms among nursing students, administered freshly prepared beetroot juice, and evaluated changes in physical, physiological and psychological symptoms after one menstrual cycle.

Objectives were to: (1) assess dysmenorrhic symptoms among nursing students; (2) administer beetroot juice to participants; and (3) evaluate its effectiveness on physical, physiological and psychological dysmenorrhic symptoms.

2. MATERIALS AND METHODS

Study design and setting. A quantitative pre-experimental one-group pretest–posttest design was used in a selected college of nursing in Coimbatore, Tamil Nadu, India. Symptoms were assessed before the intervention and again after one menstrual cycle of beetroot juice administration.

Participants and sampling. The target population comprised 92 first- and second-year B.Sc Nursing students. Thirty-four first-year students who met the eligibility criteria and consented to participate were enrolled using non-probability convenience sampling.

Instrument. Data were collected using a structured questionnaire

developed from literature review and expert opinion. It included demographic characteristics, menstrual profile, dysmenorrhic profile, physical and physiological symptoms, psychological symptoms, and post-intervention reassessment. The symptom assessment contained 35 dichotomous items scored 1 for presence and 0 for absence, giving a total score of 0–35. Scores were classified as no symptoms (0), mild (1–11), moderate (12–23), or severe (24–35). Content validity was established through expert review, and reliability and practicability were assessed through a pilot study.

Intervention and procedure. Institutional permission was obtained from the College Principal and class coordinator. Written informed consent was obtained from participants. Baseline data were collected using the English-language questionnaire. Freshly prepared beetroot juice, 50 mL/day, was administered from one menstrual cycle to the next. The same questionnaire was then administered at the end of the intervention cycle.

Statistical analysis. Frequencies and percentages were used to summarise participant characteristics and symptom frequencies. Pretest and posttest total symptom scores were compared using a paired t-test, with statistical significance set at $p < 0.05$.

3. RESULTS

Participant menstrual and dysmenorrhic profile. All 34 participants reported dysmenorrhoea. Twenty-four (70.6%) reported menarche at 12–13 years, eight (23.5%) at 14–15 years and two (5.9%) at 16–17 years. Menstruation lasted 4–7 days for 24 students (70.6%) and 2–3 days for 10 (29.4%). Twenty-six (76.5%) reported a normal bleeding pattern and eight (23.5%) excessive bleeding. Symptoms began on Day I for 26 students (76.5%) and on Days II–III for eight (23.5%). Eleven (32.4%) reported a family history of dysmenorrhoea. None reported prior medication use for dysmenorrhoea.

Physical symptoms. All four assessed physical symptoms declined after intervention. Exhaustion/lethargy decreased from 28 to 15 students; abdominal cramps from 26 to 11; backache from 28 to 12; and radiating pain to the thighs/lower back from 25 to 13.

Physiological symptoms. Reductions were observed in all ten assessed physiological symptoms. Nausea decreased from 12 to 10 students, vomiting from 13 to 6, bowel/bladder changes from 19 to 11, fainting from 9 to 3, painful breasts from 26 to 13, abdominal bloating from 4 to 3, joint pain from 16 to 11, urinary frequency from 12 to 9, dizziness from 11 to 7, and weakness from 26 to 11.

Psychological symptoms. Psychological symptom frequencies also decreased. Menstrual migraine fell from 9 to 5 students, depression from 15 to 7, irritability from 27 to 15, rapid mood changes from 23 to

16, poor concentration from 21 to 8, anxiety from 17 to 14, insomnia from 23 to 10, hypersomnia from 7 to 3, and nervousness from 23 to 19.

Pain intensity and total symptom score. At baseline, no participant reported no pain; 2 (5.9%) reported mild pain, 11 (32.4%) moderate pain, 16 (47.1%) severe pain and 5 (14.7%) very severe pain. Posttest distributions were 6 (17.6%) no pain, 9 (26.5%) mild, 15 (44.1%) moderate, 4 (11.8%) severe and 0 very severe pain.

The mean total dysmenorrhic symptom score declined from 15.05 at pretest to 8.41 at posttest, representing a mean reduction of 6.64 points. The paired t-test was statistically significant ($t = 16.03$, $df = 33$, $p < 0.05$). The original dataset did not report standard deviations, so they are not presented here.

4. DISCUSSION

The study demonstrated a substantial reduction in reported dysmenorrhic symptoms following one menstrual cycle of daily beetroot juice. The decrease was observed across physical, physiological and psychological domains, and the mean total symptom score declined by 6.64 points. The largest absolute reductions included backache, abdominal cramps, weakness, painful breasts, irritability and insomnia. Severe and very severe pain also became less frequent after the intervention.

The findings are biologically plausible but should be interpreted cautiously. Primary dysmenorrhoea is strongly associated with prostaglandin-mediated uterine contraction and pain [4]. Beetroot provides dietary nitrate and antioxidant phytochemicals, and nitrate-derived nitric oxide is associated with vasodilatory effects [7]. These mechanisms could potentially influence circulatory and inflammatory processes; however, the present study did not measure prostaglandins, nitric oxide, inflammatory markers or other physiological mediators. Therefore, the mechanism remains hypothetical rather than demonstrated.

The improvement in psychological symptoms is also noteworthy. Irritability, poor concentration and insomnia declined, although nervousness remained relatively common after intervention. Psychological and behavioural aspects of menstrual distress are multifactorial and may not be explained solely by changes in uterine physiology [5,6]. The observed reductions could reflect improvement in pain, natural cycle-to-cycle variation, participant expectations, attention from researchers, or other unmeasured factors.

Several limitations affect interpretation. First, the one-group pretest-posttest design provides no control or comparison group. Consequently, the observed change cannot be attributed solely to beetroot juice because natural variation between menstrual cycles, regression to the mean, placebo effects and changes in behaviour may also contribute. Second, the sample included only 34 first-year students from one institution and was selected by convenience sampling, limiting generalisability. Third, the symptom instrument used dichotomous yes/no responses, which may not adequately capture symptom severity or clinically meaningful change. Fourth, blinding was not feasible. Fifth, the intervention was evaluated over only one cycle, so durability of benefit remains unknown.

Future studies should use randomised controlled or well-designed quasi-experimental methods, recruit larger and more diverse samples, employ validated pain and quality-of-life measures, monitor adherence and potential confounders, and follow participants across several menstrual cycles. Comparative studies could also examine beetroot juice against usual care or another dietary intervention.

5. CONCLUSION

In this sample of nursing students, dysmenorrhoea was associated with a substantial physical and psychological symptom burden. Daily administration of 50 mL freshly prepared beetroot juice for one menstrual cycle was followed by reductions in reported physical, physiological and psychological symptoms and a statistically significant decrease in the mean total symptom score. The findings suggest that beetroot juice may have potential as a low-cost dietary adjunct for menstrual symptom management. However, the absence of a control group, small convenience sample and short follow-up mean that causality cannot be established. Controlled trials with validated outcome measures and longer follow-up are required before beetroot juice can be recommended as a standard intervention.

Table 1. Key Menstrual and Dysmenorrhic Profile (n=34)

Characteristic	n	%
Menarche 12–13 years	24	70.6
Menstruation 4–7 days	24	70.6
Normal bleeding pattern	26	76.5
Symptoms begin Day 1	26	76.5
Family history	11	32.4
Prior medication	0	0

Table 2. Selected Symptom Frequencies Before and After Intervention (n=34)

Symptom	Pretest	Posttest
Exhaustion/lethargy	28	15
Abdominal cramps	26	11
Backache	28	12
Weakness	26	11
Painful breasts	26	13
Irritability	27	15
Poor concentration	21	8
Insomnia	23	10
Nervousness	23	19

Table 3. Perceived Menstrual Pain Intensity (n=34)

Pain intensity	Pretest	Posttest
No pain	0	6
Mild	2	9
Moderate	11	15
Severe	16	4
Very severe	5	0

Table 4. Overall Symptom Score

Measure	Pretest	Posttest
Mean score	15.05	8.41
Mean reduction	—	6.64
Paired t-test	—	$t=16.03$, $df=33$, $p<0.05$

Ethical Considerations

Institutional permission was obtained from the College of Nursing Principal and class coordinator, and informed consent was obtained from all participants before data collection.

Conflict of Interest

The author declares no conflict of interest.

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