

Comparison to assess the effectiveness of active exercises and dietary ginger vs. active exercises on primary dysmenorrhea among adolescent girls

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Abstract : Dysmenorrhea refers to the occurrence of painful menstrual cramps of uterine origin. Despite of the frequency and severity of dysmenorrhea most girls do not seek medical treatment for this condition as they lack knowledge and experience of effective treatment. That's why there is need to disseminate information regarding efficacy of non-pharmacological intervention in primary dysmenorrhea. A quasi-experimental study was conducted in two colleges of nursing, Chandigarh and Mohali with the objective to assess the effectiveness of active exercises and dietary ginger vs. active exercises on primary dysmenorrhea among adolescent girls. Total 64 students between age group 17-19 years with primary dysmenorrhea were given intervention based on slip method of randomization and divided in two groups. A standardized tool i.e. numerical rating pain score (N.R.S) and menstrual distress questionnaire (M.D.Q) were used for assessing the severity of primary dysmenorrhea. The protocol for ginger administration and active exercises was prepared and validated by experts. Students in the group 1 were given dietary ginger 500mg twice in a day for three days starting from the day of menstruation and active exercises twice in a day except on the days of menstruation. Students in group 2 were given demonstration of active exercises and instructed to do it twice in a day except on the days of menstruation. Severity of disease, pain relief was compared between the groups and within the groups after one menstruation at 30 days and second menstruation at 60 days follow ups. At the end of one month of intervention i.e. at 30 days follow up, severity of dysmenorrhea decreased in both the groups though difference was not significant. At the end of second month i.e. at 60 days follow up, significant difference was found in pain relief between both the groups. Thus it concludes that combined effect of ginger and exercise have higher efficacy than exercise alone. Further studies regarding the effects of ginger on other symptoms associated with dysmenorrhea and efficacy and safety of various doses and treatment durations of ginger are warranted.

Keywords

Dysmenorrhea, active exercises, numerical rating pain score (N.R.S), menstrual distress questionnaire (M.D.Q)

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Introduction

Dysmenorrhea refers to the occurrence of painful menstrual cramps of uterine origin.¹ It is a common gynecological condition in women regardless of age and nationality. It is commonly divided into two categories based on pathophysiology. Primary dysmenorrhoea is menstrual pain without organic disease, and secondary

dysmenorrhoea is menstrual pain associated with an identifiable disease. Common causes of secondary dysmenorrhoea include endometriosis, fibroids, adenomyosis, endometrial polyps, pelvic inflammatory disease, and the use of an intrauterine contraceptive device.²

The prevalence of dysmenorrhoea is difficult to determine because of different definitions of the condition—prevalence estimates vary from 45% to 95%.^{3,4} Absenteeism from work and school as a result of dysmenorrhoea is common (13% to 51% women have been absent at least once and 5% to 14% are often absent owing to the severity of symptoms).⁵ Dysmenorrhea, especially when it is severe, is associated with a restriction of activity and absence from school or work.

Sixty percent of the dysmenorrhoeic girls were having severe or moderate pain, with severe forms giving rise to work or school absenteeism in 15% and the mild forms requiring no medication or occasional over-the-counter (OTC) analgesics in about 30% cases⁶. In another study 53% reported limitation of activities, and 12% reported absenteeism⁵.

In spite of the frequency and severity of dysmenorrhoea, most of the girls specially in rural areas do not seek medical treatment for this condition as they lack knowledge and experience effective treatment and they believe it will simply not help^{7,8}. But the scenario is quite different among the urban adolescents among whom indiscriminate use of over the counter pain killers are being reported^{9,10,11}

One reason that has been suggested as an explanation for primary dysmenorrhea is an increased production of uterine prostaglandins derived from cyclooxygenase (COX)-2 activities.^{12,13} Studies have shown that an inhibition of prostaglandin synthesis occurs through inhibition of COX-2 that could be exerted by nonspecific nonsteroidal anti-inflammatory drugs (NSAIDs). These drugs have useful effects such as anti-inflammatory, antipyretic and analgesic.^{14,15} Moreover studies have indicated that the conventional treatment for primary dysmenorrhea has a failure rate of 20% to 25%.¹⁶ These procedures may be contradictory or not tolerated by some women with primary dysmenorrhea.¹⁷ Given the contraindications and side effects of NSAIDs as well as their limited efficacy, an investigation of alternative treatments with low toxicity such as herbal products is needed.

Previous studies so far have emphasized mainly on the medicinal management of dysmenorrhoea. But, medicines always have unwanted side effects with rising frequency as a result of an exponential increase in the quantum of medicine use. However in most of the cases the drugs are taken without prescription thus multiplying the risks of consuming a banned or even a wrong drug. Moreover girls have a higher incidence of adverse effects than men¹⁸. Thus a person may become the victim of a complication which is more serious than the original disease and may even be fatal. Potentially serious gastrointestinal, hepatic, central nervous system, and renal adverse effects have occurred^{19,20}

In terms of non pharmacological treatments, there is large body of studies conducted evaluating the effectiveness of non pharmacological interventions on dysmenorrhea. According to these studies, acupressure, acupuncture, specific exercises, use of dietary ginger, hot water bottle and a few dietary modifications have proved to be effective in primary dysmenorrhoea.

It is popularly thought that exercises participation reduces the frequency and severity of premenstrual symptoms (PMS) and primary dysmenorrhea. Studies²¹ have shown that clinicians often recommended exercises and women frequently use it for symptom management,²² but this in itself does not constitute evidence of effectiveness. Also, Ginger has a long history of traditional use. It contains several constituents such as gingerol, gingerdiol, and gingerdione, beta-carotene, capsaicin, caffeinic acid and curcumin.^{23,24} It has been shown that ginger acts as an inhibitor on cyclooxygenase (COX) and lipooxygenase¹⁵, resulting in an inhibition of leukotriene²⁵ and prostaglandin²⁶ synthesis. Therefore ginger has been used as an anti-inflammatory acting by inhibition of prostaglandin synthesis⁷. Ginger is therefore worthy of consideration as an analgesic in primary dysmenorrhea.

Despite of so much of research on management of dysmenorrhea, its prevalence has been found to be 30-70% associated with morbidity if not treated in early years. Dysmenorrhea is also one of the major causes of school absenteeism in adolescent girls and it also affects quality of

life. Moreover there is a social stigma for adolescent girls to get medical treatment for dysmenorrhea. So, there is a need for non-medicinal treatment and prove their efficacy through trials. Such a trial if proved successful will make adolescent girls confident and it will also help in women empowerment. Hence, research has been conducted to find out the effectiveness of home remedies.

Objective

To assess the effectiveness of active exercises and dietary ginger vs. active exercises on severity of primary dysmenorrhea in adolescent girls of selected College of Nursing.

Material and methods

This was a quasi-experimental study conducted from July 2012-september 2012. Subjects included adolescent girls (between age group 17-19 years) with primary dysmenorrhea selected from two selected college and school of nursing, Chandigarh and Mohali.

No individual randomization was attempted. Instead the colleges were randomized for intervention into 2 groups by slip system. Mata Sahib Kaur College of Nursing was group 1 in which active exercises and administration of dietary ginger was undertaken, whereas National Institute of Nursing Education, PGIMER, Chandigarh was group 2, where only active exercises were undertaken for intervention. The Institute ethics committee of Postgraduate Institute of Medical Education and Research, Chandigarh approved the study.

Permission from Principal and higher authority of the respective colleges were taken before conducting research study. The purpose and method of the study were explained and informed written consent was obtained from participants. The inclusion criteria were all adolescent girls in the age group (17-19 years), who had attained menarche and have primary dysmenorrhea. Total 79 subjects met inclusion criteria i.e. 45 in group 1 and 34 in group 2, but 11 subjects from group 1 and 4 from group 2 were lost at first follow up. Adolescent girls who are physically handicapped, suffering from any condition in which exercise is contraindicated (e.g., recent surgery, heart disease, respiratory disease), girls with severe dysmenorrhoea, who were on any medical treatment or found to have a secondary cause on gynecological checkup, girls who were married or pregnant, girls whose period was irregular and absent for more than 2 months were excluded.

At baseline, the severity of dysmenorrhea, demographic data, and menstrual characteristics were assessed by a self-administered questionnaire which was prepared by literature review and validated by experts. Two standardized tools were also used to assess the severity before and after the intervention i.e. numerical rating pain score (N.R.S) and menstrual distress questionnaire (M.D.Q). Numerical rating pain score is a 10 point scale with worst pain rated at 10 and no pain rated at 0, whereas menstrual distress questionnaire consisted of 48 questions with scoring from 0 to 4. For each question subjects had to give scoring for most recent flow, four days before

menstruation, and remainder of the cycle. The maximum score was more than 150 given for strong dysmenorrhea and minimum score was 0-50 for mild dysmenorrhea.

Protocol of intervention was prepared through literature review and validated from experts. Intervention included dry ginger powder and active exercises. In one group combination of intervention i.e. ginger powder and active exercises were used whereas in another group only active exercises were taught. Dry ginger powder was provided in powder form to group 1 and active exercises were taught to both the groups. Dry ginger powder was available in market in 200 gm packing (catch ginger powder). Small sachets of 500mg each was prepared by using weighing scale. The protocol of consuming these sachets was, 500mg ginger powder in plain water twice in a day starting from the day of menstruation for 3 days. Active exercises included few muscle strengthening and stretching exercises as per literature. The protocol of performing these exercises was, twice in a day for 20 min except on the day of menstruation.

To measure compliance of exercises subjects were given menstrual diary which included dates of the month. Subjects had to mark the menstrual flow days with red ink whereas in the left days of calendar they had to tick mark with blue ink whether they performed exercises or not according to the protocol. Follow up Performa was also given to subjects to check the compliance of ginger. Subjects had to write the number of sachets of ginger powder they have

consumed in follow up Performa. These were collected at the end of first month and second month i.e. at 30 and 60 days. Also, the post intervention assessment of the severity of menstrual distress and intensity & duration of menstrual pain was done at the end of 1st and 2nd month.

Analysis of variance (ANOVA) and chi-square, t test was used to analyze data.

Results

Profile of girls of two groups reveals that mean age at menarche of dysmenorrheic girls was 14.03 years and 13.27 years and most of the subjects had their menarche at age more than 12 years i.e. 29 (85%) and 23 (76%) in group 1 and group 2 respectively. Menstrual cycle length in 64% of the girls is more than 30 days in group 1 and 36% in group 2. Duration of menstrual flow is 3-4 days in 44% of the subjects in experimental group 1 and 36% in experimental group 2. Both the groups were comparable as per chi square test ($p>0.05$) (**Table 1**)

Table 1: Profile of girls suffering from dysmenorrhea in experimental group 1 and 2

Variable	Experimental Group 1 n=34	Experimental Group 2 n=30	χ^2 df p-value
	n(%)	n(%)	
1. Age at menarche (Years)* • 10-12 • >12	5(14.8) 29(85.2)	7(23.4) 23(76.6)	0.49 1 0.156
2. Menstrual cycle (average of last 3 months) • <30 days • 30 days • >30 days	6(17.6) 6(17.6) 22(64.8)	9(30) 10(33.3) 11(36.7)	5.036 2 .081
3. Duration of flow (average of last 3 months) • <3 days • 3-4 days • 4-5 days • > 5 days	1(2.9) 15 (44.1) 12 (35.3) 6 (17.7)	0 (0) 11 (36.7) 12 (40) 7 (23.3)	1.448 3 .694

Table 2 depicts that N.R.S mean pain score at baseline in group 1 was 5.09 ± 2.33 which decreased to 3.85 ± 2.42 at 30 days follow up, 2.91 ± 2.45 at 60 days follow up and the difference is statistically significant as per t-test whereas in group 2 mean pain

score decreased from 5.13 ± 1.99 to 4.43 ± 1.99 at 30 days follow up, 4.13 ± 2.12 at 60 days follow up and difference is significant at 60 days follow up. When comparison is made within 30 days and 60 days follow up in group 1, pain score reduced

significantly as per t test which indicates that effect of intervention further reduces the pain when practiced for long term, whereas in group 2 this difference is not significant which indicates that the effect of intervention was same at 30 days and 60 days. Similarly M.D.Q score reduced from 50.85 ± 29.07 to 30.29 ± 24.58 at 30 days follow up and 21.26

± 17.55 at 60 days follow up in group 1, whereas in group 2 M.D.Q score reduced from 62.27 ± 49.47 to 41.83 ± 37.37 at 30 days and 44.20 ± 50.39 at 60 days follow up. M.D.Q score indicated similar impact of therapies in two groups as shown by N.R.S score.

Table 2: Mean pain score before and after intervention with in experimental group 1and 2

Experimental Groups	Within group comparison of mean pain score	
	N.R.S Score	M.D.Q Score
Group 1		
Baseline	5.09 ± 2.33	50.85 ± 29.07
30days	3.85 ± 2.43	30.29 ± 24.58
Mean difference (baseline-30days)	1.24 ± 2.32	20.56 ± 28.11
df, t-test*, p-value	33, 3.10, 0.004	33, 4.26, .001
Baseline	5.09 ± 2.33	50.85 ± 29.07
60days	2.91 ± 2.45	21.26 ± 17.55
Mean difference (baseline-60days)	2.17 ± 2.72	29.58 ± 28.05
df, t-test*, p-value	33, 4.67, 0.001	33, 6.15, .001
30days	3.85 ± 2.43	30.29 ± 24.58
60 days	2.91 ± 2.45	21.26 ± 17.55
Mean difference (30days-60days)	0.94 ± 2.08	9.03 ± 17.93
df, t-test*, p-value	33, 2.63, 0.013	33, 2.94, .006
Group 2		
Baseline	5.13 ± 1.99	62.27 ± 49.47
30days	4.43 ± 1.99	41.83 ± 37.37
Mean difference (baseline-30days)	0.70 ± 1.84	20.43 ± 29.08
df, t-test*, p-value	29, 2.08, 0.046	29, 3.89, .001
Baseline	5.13 ± 1.99	62.27 ± 49.47
60days	4.13 ± 1.99	44.20 ± 50.39
Mean difference (baseline-60days)	1.00 ± 1.80	18.06 ± 24.72
df, t-test*, p-value	29, 3.04, 0.005	29, 4.01, .001
30days	4.43 ± 1.99	41.83 ± 37.37
60 days	4.13 ± 2.12	44.20 ± 50.39
Mean difference (30days-60days)	0.30 ± 1.49	-2.36 ± 22.02
df, t-test*, p-value	29, 1.11, 0.279	29, -5.89, 0.561

*Paired t test

Table 3 depicts that when comparison is made between the groups, no significant difference was found at baseline and at 30 days follow up pain score in two groups, although the N.R.S pain score reduced significantly from 5.09 ± 2.33 to 3.85 ± 2.45 in group 1 and from 5.13 ± 1.99 to 4.43 ± 1.99 in group 2, means both the interventions are equally effective at 30 days follow up whereas at 60 days follow up in group 1 the

mean pain score was significantly lesser than the group 2 as per unpaired t test ($p < 0.05$) which predicts that combination of intervention i.e. active exercises and dietary ginger, if used for long term basis is more effective than the active exercises alone. M.D.Q score also indicated similar impact of therapies between two groups as shown by N.R.S score.

Table 3: Mean pain score before and after intervention between experimental group 1 and 2

Time period		Scale used to score pain	Pain Score		t-test between the groups** df*, t-value, p-value
			Group 1 Mean \pm S.D	Group 2 Mean \pm S.D	
Before Intervention	Baseline	M.D.Q	50.85 ± 29.07	62.27 ± 49.47	-1.141, 0.258
		N.R.S	5.09 ± 2.33	5.13 ± 1.99	-0.083, 0.934
After Intervention	30 days	M.D.Q	30.29 ± 24.58	41.83 ± 37.37	-1.475, 0.145
		N.R.S	3.85 ± 2.45	4.43 ± 1.99	-1.037, 0.304
	60 days	M.D.Q	21.26 ± 17.55	44.20 ± 50.39	-2.490, 0.015
		N.R.S	2.91 ± 2.45	4.13 ± 2.12	-2.107, 0.039

df = *62, ** Independent t test

Discussion

Menstruation though a normal physiological process is many a times associated with premenstrual and menstrual disturbances. These disturbances may sometimes be very severe leading to loss of work days. The pain of dysmenorrhea is difficult to measure partly because it is usually accompanied by other unpleasant sensations which affect the judgment of pain. Dysmenorrhea, should therefore be

regarded as a multidimensional phenomenon and thus be measured by a multidimensional scoring system. In the present study, the severity of dysmenorrhea was measured by numerical rating pain score (N.R.S) and menstrual distress Questionnaire (M.D.Q).

A lot of randomized controlled trials have been conducted to assess the effectiveness of various other home remedies on primary dysmenorrhea as these

does not involve any cost and are readily available. These remedies also do not involve any side effects as is associated with over the counter medication. Ozgoli et al²² (2006-2007) studied the comparison of effects of ginger, mefenamic acid and ibuprofen on pain in women with primary dysmenorrhea and concluded that ginger was as effective as mefenamic acid and ibuprofen in relieving menstrual pain. Students in the ginger group took 250 mg capsules of ginger rhizome powder four times a day for three days from the start of their menstrual period. Whereas present study was done to compare the effectiveness of combination of intervention i.e. dry ginger powder and active exercises with active exercises alone. Dry ginger powder was used in dosage of 500mg and the protocol was that it has to be taken twice in a day with plain water for 3 days from the start of menstruation.

Rahnama et al²³ used two protocols, where in the first protocol ginger and placebo were given two days before the onset of the menstrual period and continued through the first three days of the menstrual period. In the second protocol ginger and placebo were given only for the first three days of the menstrual period and dose was 500 mg of ginger powder in capsule form three times a day for both the groups and concluded that there were significant differences in the severity of pain between ginger and placebo groups for both the protocols. There was also significant difference in duration of pain between the two groups for protocol one but not for protocol two. Similar findings were also found in the present study in which significant difference was found in the group

in which combination of intervention i.e. active exercises and dry ginger powder was used for consecutive 2 months.

Jerdy et al²⁴ studied the effects of stretching exercises on primary dysmenorrhea in adolescent girls (2012) which the subjects were requested to do for 8 weeks (3 days per week, 2 times per day, 10 minutes each time) at home. He found that stretching exercises are effective in reducing pain intensity, pain duration, and the amount of painkillers used by girls with primary dysmenorrhea. Chaudhury²⁵ (2011) studied the impact of exercise and hot water bottle use on primary dysmenorrhea and result revealed that both exercises and hot water bottle led to a significant relief in the severity of pain and menstrual distress in the respective study groups. The result of the present study revealed that both active exercise and combination of exercise and dietary ginger led to a significant relief in the severity of pain. Present study also was used to assess the effectiveness of active exercise on dysmenorrhea and results were similar to studies by Jerdy et al²⁴ and Chaudhary²⁵ (2011). Thus though exercises are beneficial and involve no cost but combination of exercise and dietary ginger increases the benefit as is evident from our results, Also, it concludes that if the combination of remedies is used for long term basis it enhances the effectiveness.

There are many non pharmacological method of intervention which are readily available, involves no cost and does not have any side effects which includes hot water bottle, dietary modification, and dry ginger powder, exercises and so on. Present study

results conclude that combination of intervention i.e. active exercises and dry ginger powder if used for long term basis is much more effective than active exercises alone. So, these methods should be preferred instead of over the counter medication. It also concludes that compliance needs to be improved among subjects as compliance with the intervention was found poor among subjects.

Non-pharmacological methods of management of primary dysmenorrhea should be included in the curriculum at school as well as college level to prevent loss of work days. Home remedies should be considered as the first line treatment for dysmenorrhea in home as well as community setting. There is a need to disseminate information on primary dysmenorrhea through mass media, to the general public at large, that effective treatment based on home based remedies is available. Routine screening of the girls with primary dysmenorrhea should be done at school as well as at college level so that girls with secondary dysmenorrhea can be referred to gynaecologist. Although there are many studies proving the effectiveness of the exercise and ginger on primary dysmenorrhea, proper dosage of ginger and duration of treatment has not been generalized. So, further research should be directed to achieve this goal. Similar studies in other settings are recommended to test the feasibility and effectiveness of ginger therapy in large segments of population. Further studies regarding the effects of ginger on other symptoms associated with dysmenorrhea and efficacy and safety of

various doses and treatment durations of ginger are warranted.

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