Effect of Aromatherapy Abdominal Massage using Peppermint Versus Ginger oils on Primary Dysmenorrhea among Adolescent Girls

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Abstract: Primary dysmenorrhea (PD) is one type of painful menstruation. Because of recent concerns about pharmacological therapy, several studies investigated the efficacy of numerous non pharmacological therapy for the relief of dysmenorrhea such as aromatherapy. Aromatherapy is the therapeutic use of essential oils obtained from plants. Currently there is a lack of sound evidence regarding the appropriate use of aromatherapy for menstrual cramps. Therefore, this study **aimed** to identify the effect of aromatherapy abdominal massage using peppermint versus ginger oils on primary dysmenorrhea among adolescent girls. **Setting**: The study was conducted at the Faculty of Nursing, Alexandria University in Egypt. The **sample** comprised a 120 eligible nursing students who were suffering of moderate to severe primary dysmenorrhea. They were randomly assigned equally into 3 groups: study group (1) had received aromatherapy massage by peppermint oil. Study group (2) had received aromatherapy massage by ginger oil. Control group (3) had received massage by almond oil. Each subjects in the three groups received 15 minutes of aromatherapy, once daily for five consecutive days prior to menstruation for two successive cycles using a randomized control clinical trial study design. Three **tools** were validated and used for data collection; basic data and menstrual history interview schedule, Visual Analogue pain intensity Scale (VAS)and Menstrual symptom questionnaire (MSQ). **Results**: The main study findings show that, before intervention there was no statistically significant difference between the study and control groups regarding the severity of primery dysmenorrhea and its associated symptoms. Yet, students who received aromatherapy massage with either peppermint or ginger oils showed significantly reduction on the severity of dysmenorrhea and its location as well as daily life activities than control group, one and two months after intervention. Duration of pain, anorexia, diarrhea and/or constipation and level of mood were significantly improved among study group who received aromatherapy massage with peppermint oil. On the other hand nausea /vomiting, dizziness/ fatigue and headache were significantly improved among study group who received aromatherapy massage with ginger oil than the other two groups. The study **Concluded** that aromatherapy by either peppermint or ginger oils is effective in alleviating menstrual pain and its location. Peppermint is effective in improving the duration of pain, anorexia, diarrhea and/or constipation and level of mood. While ginger is effective in relieving nausea /vomiting, dizziness/ fatigue and headache.
[Sahar Anwar Rizk. **Effect of Aromatherapy Abdominal Massage using Peppermint Versus Ginger on primary dysmenorrhea among adolescent girls.** *J Am Sci* 2013;9(11):497-505]. (ISSN: 1545-1003).
http://www.jofamericanscience.org. 63

1. Introduction:

Dysmenorrhoea, or painful menstruation, is one of the most common gynecological disorders among adolescents and young adult females. It is defined as a pelvic pain directly related to menstruation that interfere with daily life activities that contributes to absenteeism from school and work. Dysmenorrhoea, classified into two broad categories: primary or secondary dysmenorrhea. [1]

Primary dysmenorrhoea is a painful menstruation that occurs in the absence of recognizable pelvic pathology and commonly begins when the ovulatory menstrual cycle starts. Prevalence of primary dysmenorrhea is reported in many studies to vary between 50% and 90%. it caused by increased endometrial prostaglandin production and almost always its occurrence intense between the 20-24years old age group and it decreases progressively thereafter. It is characterized by fluctuating, spasmodic menstrual cramps that starts a few hours before menstruation and lasts for up to 72 hours. It is usually most severe on the first day of menstruation and gradually diminishes. The crampy pain is suprapubic in location with radiation into the inner aspects of two thigh. It may be accompanied by headache, dizziness, diarrhea, a bloated feeling, nausea and vomiting, backache and leg pain. [1,2]

Secondary dysmenorrhoea, on the other hand, is associated with pelvic conditions or pathology that cause pelvic pain inconjunction with the menses. This usually appears later in a woman's reproductive life and can occur with anovulatory cycles. It often lasts

for 5 to 7 days each month, and progressively increases in severity. [3]

The etiology of primary dysmenorrhea is not completely understood. The pain is generally associated with increased prostaglandin synthesis (PGF2α) and inflammation during menstruation which result in uterine contractions and vasoconstriction this uterine hypercontractility and ischemia lead to pain and other symptoms. [4]

Treatment approach for primary dysmenorrhea includes pharmacological as well as non pharmacological treatment approaches. Pharmacological approaches may not be entirely effective and has side effect for about 15% of women with primary dysmenorrhea. In addition, Egyptian young women/girls are not preferring to use medication for dysmenorrhea as they believes that it may affect fertility or causing some types of dependence. [4] So several researchers have investigated the efficacy of numerous complementary/alternative therapies for the relief of dysmenorrhea such as dietary therapies, behavioral interventions, acupressure and aromatherapy. Aromatherapy means the use of essential fragrant oils (the pure volatile portion of aromatic plant produces normally extracted by distillation) for therapeutic or medical purposes. It is effective for relaxing, reducing pain and stress, improving coping mechanisms and increasing the sense of wellness. [3-5]

Among the recommended essential oils which have sedative effect is the use of ginger and / or peppermint. Ginger, the rhizome officinale, inhibits cyclooxygenase and lipooxygenase pathways in prostaglandin synthesis and the gingerols in ginger have anti-inflammatory effects that leads to reduction in prostaglandins and consequent pain relief. On the other hand, Menthol and methyl salicylate are the main active ingredients of peppermint oil. Internally, it have anti-spasmodic actions, with calming effects on the muscles of the stomach, intestinal tract, and uterus. It also have powerful analgesic (pain-killing) properties, which are mediated, in part, through activation of kappa-opioid receptors, which help block pain signal transmission. [6,7]

Essential oil can be applied to the body through may ways inhalation, topical methods, or ingestion. Inhaled aromas have the fastest effect, through which olfactory receptor cells are stimulated and the impulses are transmitted to the emotional center of the brain. When aromas used in massage, essential oils are not only inhaled but also absorbed through the skin. It penetrate the tissues and detected in the blood within 20 minutes where it transported to the body systems. [6,7]

Massage is the application of manual stock technique. The various strokes include, friction (focused circular movements using pads of the thumbs and fingers or the heel of hand to penetrate deeper muscle layers or work around joints), petrissage (kneading the muscle body with the fingers and thumb of each hand alternatively in large c-shaped motions), vibration (rapid shaking movements with fingers or the hand to stimulate or relax muscles) and effleurage. Effleurage is a slow, rhythmic stroking with light skin contact. It may be applied with varying degrees of pressure, depending on the part of the body being massaged and the outcome desired. The palmer surface of the hands is used for larger surfaces with the thumbs and fingers used for smaller area. [8,9]

Although there is an increased evidence for the efficacy of numerous complementary/alternative therapies for the relief of menstrual problems. There is a little knowledge about the effect of different aromatherapy for management of dysmenorrhea among adolescents' girls. [8] This raises the attention to investigate the effect of aromatherapy abdominal massage using peppermint versus ginger on primary dysmenorrhea. The availability of such information could be important for the development and provision of the appropriate health management of dysmenorrhea. [10]

Aim of the Study

This study aimed to: identify the effect of aromatherapy abdominal massage using peppermint versus ginger oils on primary dysmenorrhea among adolescent girls.

2. Materials and Method
Design:
This is a randomized, controlled clinical trial.
Materials
Setting:
The study was conducted at Faculty of Nursing-Alexandria University.
Subject:
The study will comprised a convenience sample of 120 female students in the third & fourth years at the Faculty of Nursing-Alexandria University they were surveyed to pin point those who suffer from moderate to severe primary dysmenorrhea (PD). Students were eligible to participate in the study, if they were single, aged 17–21 year-old at the time of the study, with regular cycles 21 to 35 days lasting three to seven days, don't receiving analgesics during the study period, do not use hormonal replacement therapy during the last 6 months and had no systemic or gynecologic disease.

Six students were dropped from the study subjects and they replaced by another 6 eligible one.

Then each of the 120 students were randomly assigned into three groups, 40 students are included in each group. Study group (1) had received aromatherapy massage by peppermint oil. Study group

(2) had received aromatherapy massage by ginger oil. Control group (3) had received massage by almond oil.

Tools: Three tools will be used for data collection:

Tool (1): **Basic data and menstrual history interview schedule:** it was developed by the researcher and includes two parts: Part one includes Socio-demographic characteristics such as: age, residence, academic year. Part two includes Menstrual history such as: age of menarche, menstrual interval, amount of blood flow, duration and location of pain.

Tool (II): **Visual Analogue pain intensity Scale (VAS)** [11]. It was used by the researcher to determine the severity of pain before and after intervention. It is a self- reported 10 cm straight line which represents the pain intensity, the two opposite ends representing no pain to pain as bad as it could be in between these two phrases, words like mild pain, moderate pain, severe pain, very severe pain are assigned to each 2 cm distance respectively.

Tool (III): Menstrual symptom questionnaire (MSQ) [3,12,13]. It entails two main sections

Section one: It was developed and used by the researcher to assess the physical and psychological symptoms that associated with dysmenorrhea. It entails 7 items, for each item the subject has to choose one of four alternatives: (0) absent, (1) mild, (2) moderate, or (3) sever. Total score was range from 0 to 21. The subject will be considered to have:

- No dysmenorrheal symptom (DS) if her total score < 6
- Mild DS if her total score 6-11
- Moderate DS if her total score 12-17
- Sever DS if her total score > 17

Section two: It was concerned with the effect of dysmenorrhea on daily activities. It contains three items. For each one of the four items the subject has to choose one of four alternatives: (0) absent, (1) mild, (2) moderate, or (3) sever.

total score will range from 0-9. The subject will be considered to have:

- No effect if her total score < 2
- Mild effect if her total score 2-4
- Moderate effect if her total score 5-7
- Sever effect if her total score ≥8

Methods

-Approval was obtained from the Ethical Committee of the faculty of nursing- Alexandria University and then from responsible authorities of the study setting.

Development of tools I & III were done by the researcher after extensive review of relevant and recent literature. While tool II was adopted and used by the researcher. Tools content validity was assessed by a jury of 5 experts in the related field. Tool III reliability was accomplished by split half reliability

technique. It has high internal consistency with (Cronbach's alphas = 0.826)

A pilot study was carried out on 12 students to ascertain the clarity and applicability of the tools as well as to calculate the time needed to its completion. Based on the pilot results; modifications of some statements in the tool I were done. The subjects of the pilot were excluded from the main study sample.

The study was conducted through three phases:

The prescreening phase:

All female students in third & fourth years in the previously mentioned setting given a proper explanation about the study purpose, design, and subject's role. The explanation was done using power point presentation at classroom for small group (15-20) students each time. Then they were individually interviewed by the researcher to collect the basic data using (tool 1)

The screening phase:

The researcher screen all female students for moderate to severe primary dysmenorrhea and its associated symptoms during menstrual cycle using tools (II&III). Those who was diagnosed as moderate to severe PD and meet the eligible criteria were included in the study. Detailed explanation about primary dysmenorrhea, its associated symptoms and management especially the effect and technique of aromatherapy was given. Then they randomly assigned into three groups, 40 students are included in each group.

- **Ethical consideration**: an oral consent was obtained from each subject. They were also reassured that all research data will be confidential and used only for the purpose of the study. Participants were also informed about their right to withdraw from the study at anytime without giving any reason.

The implementation phase:

The experimental groups 1&2: received 15 minutes of aromatherapy provided topically in the form of abdominal massage in a quiet room by the researcher, once daily at a fixed time for five consecutive days that preceding menstruation using peppermint or ginger oils with final concentration 1.5% for each of them, for two successive menstruation.

Massage was applied while the students were lying in a supine position. A cushion was placed under the subject's knees to keep the abdomen relaxed. Massage was on the region above the symphysis pubic. The researcher, poured 3-4 drops of either peppermint or ginger oil into her hands and applied the massage with clockwise circular movements (effleurage). The researcher's left hand was placed on the right hand and both hands were placed on the abdomen without overpressure

The researcher repeated the same procedure in each of the following five days

The control (placebo group): received the same intervention of aromatherapy group with almond oil.

Outcome Measures:

The primary outcome measure was the pain level experienced by the students; it was assessed by visual analogue scale tool II. Secondary outcome measures included the duration of pain (hours) and location of pain by study tool (I). Third outcome measures included the severity of primary dysmenorrhea symptoms as well as their daily activities by tool III. Outcome measures were evaluated on the second day of menstruation for the three assessment points during the course of the study (at a baseline, after one and two months of intervention).

Statistical analysis:

Statistical analysis was performed using SPSS version 16.0 for windows. Frequency & percentage were used for describing and summarizing categorical data. Monte Carlo test and Chi Square test *significant at $P \leq 0.05$ to compare between the severity of primary dysmenorrhea and its associated symptoms before and after intervention in between groups was done.

3. Results

Table (1) indicates absence of any significant differences between the study and control groups in their academic year, age, and residence, age of menarche, duration and amount of menstruation. Where, around half (45.0% &52.5%) respectively of both study group 1 and control group were in the third academic year, while 72.5% of the study group 2 were in the fourth academic one. Less than two-thirds (62.5%) of the study group1 were 19 years old or more, compared to 47.5% & 57.5% respectively of the study groups 2 and control group. Almost equal proportions of the study group1 (52.5%) and control group (45%) were urban residents compared to 32.5% of the study group 2. More than two-fifths (42.5%&45%) of study group 1&2 starts their menarche at 12 years old or less compared to 62.5% of control group their menarche start at 13 years old or more. As regarding amount of menstrual flow 52.5%&47.5% of the study group 1 and control group reported that their menstrual flow was scanty compared to 22.5% of study group 2 `had excessive menstrual flow.

According to table (2) the majority (77.5%& 62.5%&75% respectively) of the study groups 1&2 and control group had moderate primary dysmenorrheal(PD) before the intervention with no statistically significant difference between them. One and two months after the intervention, there was a statistically significant (^{MC}P<0.000) decrease in the severity of PD among study1 &2 than control groups. Yet, as much as 27.5%& 22.5 % of the control group

had severe PD compared to only non of study group1 and only 5%&2.5% respectively among study group2 after intervention. Primary dysmenorrhea were completely absent after one and two months among 52.5% & 57.5% respectively of study group 1and 42.5% & 42.5% respectively of study group 2compared to none&7. 5% respectively of the control group.

Table (3) clarifies that there was no statistically significant differences between the study and control groups regarding the sit of primary dysmenorrhea before intervention (P=0.134). One and two months after the intervention, there was a statistically significant difference (P=0.000) between the study and control groups (who suffer from menstrual pain) in favor of the study groups 1&2 in relation to location of menstrual pain. PD where located at lower abdomen only for 15% &18.9% of the control group compared to more than half (57.9%& 58.8%) of study group 1 and 56.5%& 60.9% of the study group 2 respectively. Meanwhile, the majority (85%) of the control group was still complaining from menstrual pain at lower abdomen that radiated in back and thighs one month after the intervention compared to 42.1% of the study group1 and 43.5% of the study group 2. Again, the same pattern was observed two months after the intervention.

Table (4) illustrate that there is a no statistical significant difference recognized between the study and control groups before intervention regarding the duration of pain (P=0.639). Unfortunately, one and two months after the intervention the duration of primary dysmenorrhea (among the study subject who suffer from menstrual pain) lasted less than 18 hours for the majority of (89.5%& 100%) of the study group 1 compared to 56.5%& 65.2% for the study group2 and more than two –fifths (45%&45.9%) of the control group. The difference was a statistically significant (^{MC}P=0.000) between study groups in favor of the study group 1. The duration of PD continue for 18 hours or more among more than half (55 %&54.1%) of the control group compared to only (10.5%&non) of the study group 1 and 43.5%& 34.8% of the study group 2 respectively one and two months after the intervention. The difference was a statistically significant (^{MC}P=0.000) in favor of the study group 1.

Table (5) portrays the percent distribution of the study subjects according to the severity of primary dysmenorrhea symptoms over time. There was no statistically significant difference between the study and control groups regaring these symptoms before intervention. However, One and two months after the intervention, there was a statistically significant improvement in some symptoms associated with PD in favor of the study group 1 in relation to : anorexia

(^{MC}P =0.003& ^{MC}P =0.001) & Diarrhea& constipation (P=0.038 & ^{MC}P=0.015) & and mood changes (P= 0.028 & ^{MC}P=0.008)respectively. But the picture was different as there was statistically significant difference between both groups in favor of the study group 2 one and two months after the intervention in relation to nausea and vomiting (^{MC}P =0.007& ^{MC}P <0.000) & Dizziness and fatigue (^{MC}P=0.002& ^{MC}P=0.001) and Headache (^{MC}P=0.011& ^{MC}P<0.000) respectively. On the other hand there was no statistically significant difference in relation to signs of water retention.

Table (6) exhibits percent distribution of the study subjects according to the effect of primary dysmenorrhea on their daily life activities over time. Before the intervention, study and control groups had approximately equal effect of PD on their daily life activities. The most significant improvement (^{MC}P=0.028) was observed in academic productivity regarding the study group1&2 than control group. Moreover there was a statistically significant difference (^{MC}P=0.020) between study and control groups in favor of the study groups 1&2 regarding the effect of PD on social life activities. The same pattern was observed two months after the intervention. On the other hand, there was no significant difference (^{MC}P=0.249) regarding home responsibilities among the study and control groups one month after intervention. While, two months after intervention there was a statistically significant improvement (^{MC}P=0.003) on home responsibilities among the study group 1&2 than the control group.

Table (1): Number and percent distribution of the study subjects according to their basic data and menstrual history

Basic data	Study 1 (n=40)		Study 2 (n=40)		Control (n=40)		Significant test (p value)
	No.	No.	No.	%	No.	%	
Academic year							X^2 = 5.417 P = 0.067
• Third	18	45.0	11	27.5	21	52.5	
• Fourth	22	55.0	29	72.5	19	47.5	
Age in years							^{MC}P = 0.369
• ≤ 18	15	37.5	21	52.5	17	42.5	
• 19-21	25	62.5	19	47.5	23	57.5	
Residence							^{MC}P = 0.482
• Urban	21	52.5	13	32.5	18	45.0	
• Rural	19	47.5	27	67.5	22	55.0	
Age at menarche/years							X^2 = 0.480 P = 0.787
• ≤ 12	17	42.5	18	45.0	15	37.5	
• 13-15	23	57.5	22	55.0	25	62.5	
Duration of menstrual cycle/days							X^2=1.404 P=0.496
• ≤ 4	23	57.5	32	80.0	24	60.0	
• 5-7	17	42.5	8	20.0	16	40.0	
Amount of menstrual flow /days							X^2=3.799 P=0.434
• Scanty (1 pad)	21	52.5	13	32.5	19	47.5	
• Average (2-3 pads)	12	30.0	18	45.0	15	37.5	
• Excessive (≥4 pads)	7	17.5	9	22.5	6	15.0	

^{MC}P: Fisher's Exact test (Monte Carlo method); X^2: Chi-Square test

Table (2): Number and percent distribution of the study subjects according to severity of primary dysmenorrhea before and after intervention

Severity of dysmenorrhea	Before intervention						After one month of intervention						After two months of intervention					
	Study 1 (n=40)		Study 2 (n=40)		Control (n=40)		Study 1 (n=40)		Study 2 (n=40)		Control (n=40)		Study 1 (n=40)		Study 2 (n=40)		Control (n=40)	
	No.	%	No	%	No	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Absent	0	0.0	0	0.0	0	0.0	21	52.5	17	42.5	0	0.0	23	57.5	17	42.5	3	7.5
Mild	0	0.0	0	0.0	0	0.0	9	22.5	13	32.5	4	10.0	11 20	27.5	15	37.5	6	15.0
Moderate	31	77.5	25	62.5	30	75.0	10	25.0	8	20.0	25	62.5	6	15.0	7	17.5	22	55.0
Sever	9	22.5	15	37.5	10	25.0	0	0.0	2	5.0	11	27.5	0	0.0	1	2.5	9	22.5
Significance (p value)	X^2=2.544; p =0.280						^{MC} p <0.000*						^{MC} p <0.000*					

^{MC}P: Monte Carlo test; X^2: Chi-Square test; *significant at p ≤0.05

Table (3): Number and percent distribution of the study subjects according to site/location of primary dysmenorrhea over time

Site/location of dysmenorrhea	Study 1 (n=40)		Study 2 (n=40)		Control (n=40)		Study 1 (n=40)		Study 2 (n=40)		Control (n=40)		Study 1 (n=40)		Study 2 (n=40)		Control (n=40)	
	No	%	No	%	No	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Presence of Pain: Yes No	40 0	100 0	40 0	100 0	40 0	100 0	19 21	47.5 52.5	23 17	57.5 42.5	40 0	100 0.0	17 23	42.5 57.5	23 17	57.5 42.5	37 3	92.5 7.5
							(n=19)		(n=23)		(n=40)		(n=17)		(n=23)		(n=37)	
At lower abdomen and radiated in back and thighs	25	62.5	29	72.5	33	82.5	8	42.1	10	43.5	34	85.0	7	41.2	9	39.1	30	81.1
At lower abdomen	15	37.5	11	27.5	7	17.5	11	57.9	13	56.5	6	15.0	10	58.8	14	60.9	7	18.9
Significance (p value)	X^2=4.013 p =0.134						X^2=46.385 p =0.000*						X^2=34.289 p =0.000*					

^{MC}P: Monte Carlo test; X^2: Chi-Square test; *significant at P≤0.05

Table (4): Number and percent distribution of the study subjects according to duration of primary dysmenorrhea (menstrual pain) before and after intervention

Duration of the present menstrual pain	Before intervention						After one month of intervention						After two months					
	Study 1 (n=40)		Study 2 (n=40)		Control (n=40)		Study 1 (n=40)		Study 2 (n=40)		Control (n=40)		Study 1 (n=40)		Study 2 (n=40)		Control (n=40)	
	No	%	No	%	No	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Presence of Pain: Yes	40	100	40	100	40	100	19	47.5	23	57.5	40	100	17	42.5	23	57.5	37	92.5
No	0	0.0	0	0.0	0	0.0	21	52.5	17	42.5	0	0.0	23	57.5	17	42.5	3	7.5
							(n=19)		(n=23)		(n=40)		(n=17)		(n=23)		(n=37)	
< 18 hrs	26	65.0	22	55.0	23	57.5	17	89.5	13	56.5	18	45.0	17	100	15	65.2	17	45.9
≥18 hrs	14	35.0	18	45.0	17	42.5	2	10.5	10	43.5	22	55.0	0	0.0	8	34.8	20	54.1
Significance (p value)	$X^2=0.897$ $p=0.639$						$^{MC}p<0.000*$						$^{MC}p<0.000*$					

^{MC}P: Monte Carlo test; X^2: Chi-Square test; *significant at $p \leq 0.05$

Table (5) Percent distribution of the study subjects according to the severity of primary dysmenorrheal symptoms before and after intervention

Severity of dysmenorrhea symptoms		Before intervention			After one month of intervention			After two months		
		Study 1 (n=40)	Study2 (n=40)	Control (n=40)	Study 1 (n=40)	Study 2 (n=40)	Control (n=40)	Study 1 (n=40)	Study 2 (n=40)	Control (n=40)
		%.	%.	%.	%	%	%	%	%	%
Nausea and vomiting	Absent	17.5	22.5	25.0	32.5	60.0	22.5	35.0	67.5	17.5
	Mild	10.0	17.5	20.0	22.5	22.5	17.5	22.5	20.0	22.5
	Moderate	50.0	52.5	42.5	35.0	15.0	45.0	32.5	12.5	40.0
	Severe	22.5	7.5	12.5	10.0	2.5	15.0	10.0	0.0	20.0
Significance (p value)		$X^2=5.649$ $p=0.464$			$^{MC}p=0.007*$			$^{MC}p<0.000*$		
Anorexia	Absent	17.5	15.0	12.5	50.0	25.0	12.5	52.5	27.5	10.0
	Mild	22.5	15.0	22.5	25.0	35.0	22.5	22.5	32.5	25.0
	Moderate	35.0	52.5	42.5	15.0	30.0	42.5	17.5	32.5	40.0
	Sever	25.0	17.5	22.5	10.0	10.0	22.5	7.5	7.5	25.0
Significance (p value)		$X^2=3.045$ $p=0.803$			$^{MC}p=0.003*$			$^{MC}p=0.001*$		
Diarrhea& constipation	Absent	37.5	25.0	35.0	60.0	32.5	35.0	65.0	37.5	32.5
	Mild	17.5	17.5	27.5	20.0	40.0	20.0	17.5	22.5	40.0
	Moderate	27.5	45.0	30.0	15.0	15.0	30.0	10.0	27.5	25.0
	Sever	17.5	12.5	7.5	5.0	12.5	15.0	7.5	12.5	2.5
Significance (p value)		$^{MC}p=0.428$			$^{MC}p=0.038*$			$^{MC}p=0.015*$		
Signs of water retention *	Absent	35.0	30.0	25.0	42.5	40.0	27.5	37.5	45.0	25.0
	Mild	25.0	35.0	20.0	27.5	25.0	45.0	32.5	25.0	40.0
	Moderate	30.0	27.5	40.0	20.0	27.5	20.0	17.5	22.5	22.5
	Sever	10.0	7.5	15.0	10.0	7.5	7.5	12.5	7.5	12.5
Significance (p value)		$^{MC}p=0.614$			$^{MC}p=0.532$			$^{MC}p<0.612$		

*swelling of extremities, weight gain; ^{MC}P: Monte Carlo test; X^2: Chi-Square test; *significant at $p \leq 0.05$

Continue Table (5)

Severity of PMS symptoms		Before intervention			After one month of intervention			After two months		
		Study 1 (n=40)	Study 2 (n=40)	Control (n=40)	Study 1 (n=40)	Study 2 (n=40)	Control (n=40)	Study 1 (n=40)	Study 2 (n=40)	Control (n=40)
		%	%	%	%	%	%	%	%	%
Dizziness and fatigue	Absent	7.5	5.0	15.0	22.5	45.0	7.5	25.0	50.0	12.5
	Mild	10.0	7.5	22.5	27.5	22.5	20.0	30.0	25.0	22.5
	Moderate	45.0	42.5	30.0	32.5	27.5	40.0	27.5	25.0	35.0
	Sever	37.5	45.0	32.5	17.5	5.0	32.5	17.5	0.0	30.0
Significance (p value)		$^{MC}p=0.212$			$^{MC}p=0.002*$			$^{MC}p=0.001*$		
Headache	Absent	25.0	15.0	25.0	32.5	57.5	25.0	35.0	62.5	25.0
	Mild	20.0	27.5	17.5	32.5	20.0	17.5	35.0	22.5	20.0
	Moderate	35.0	47.5	42.5	27.5	15.0	35.0	22.5	15.0	30.0
	Sever	20.0	10.0	15.0	7.5	7.5	22.5	7.5	0.0	25.0
Significance (p value)		$^{MC}p=0.598$			$^{MC}p=0.011*$			$^{MC}p<0.000*$		
mood changes(nervousness)	Absent	7.5	17.5	12.5	40.0	32.5	12.5	47.5	27.5	12.5
	Mild	35.0	25.0	20.0	22.5	35.0	22.5	22.5	35.0	25.0
	Moderate	35.0	42.5	47.5	25.0	27.5	42.5	17.5	30.0	37.5
	Sever	22.5	15.0	20.0	12.5	5.0	22.5	12.5	7.5	25.0
Significance (p value)		$^{MC}p=0.594$			$^{MC}p=0.028*$			$^{MC}p=0.008*$		

^{MC}P: Monte Carlo test; X^2: Chi-Square test; *significant at $P \leq 0.05$

Table (6) number and percent distribution of study subjects according to the effects primary dysmenorrhea on their daily life activates before and after intervention

Negative effect on daily life activities		Before intervention			After one month of intervention			After two months of intervention		
		Study1 (n=40)	Study2 (n=40)	Control (n=40)	Study1 (n=40)	Study2 (n=40)	Control (n=40)	Study1 (n=40)	Study2 (n=40)	Control (n=40)
		%	%	%.	%	%	%	%	%	%
Academic productivity	Absent	12.5	17.5	17.5	45.0	37.5	17.5	47.5	42.5	20.0
	Mild	25.0	17.5	22.5	27.5	37.5	25.0	25.0	35.0	20.0
	Moderate	47.5	52.5	42.5	25.0	20.0	45.0	27.5	20.0	45.0
	Sever	15.0	12.5	17.5	2.5	5.0	12.5	0.0	2.5	15.0
Significance (*p* value)		X^2=1.714 *p* =0.944			MC *p* =0.028*			MC *p* <0.002*		
social life activities	Absent	15.0	15.0	22.5	37.5	27.5	12.5	40.0	32.5	12.5
	Mild	22.5	27.5	20.0	30.0	40.0	22.5	22.5	37.5	22.5
	Moderate	50.0	42.5	47.5	27.5	25.0	42.5	27.5	20.0	50.0
	Sever	12.5	15.0	10.0	5.0	7.5	22.5	10.0	10.0	15.0
Significance (*p* value)		X^2=2.007*p* =0.919			MC *p* =0.020*			MC *p* =0.026*		
home responsibilities	Absent	15.0	5.0	15.0	37.5	37.5	15.0	37.5	32.5	10.0
	Mild	27.5	20.0	27.5	25.0	25.0	25.0	35.0	40.0	22.5
	Moderate	42.5	47.5	42.5	30.0	30.0	45.0	22.5	20.0	45.0
	Sever	15.0	27.5	15.0	7.5	7.5	15.0	5.0	7.5	22.5
Significance (*p* value)		MC *p* =0.208			MC *p* =0.249*			MC *p* =0.003*		

MCP: Monte Carlo test; X^2: Chi-Square test; *significant at *p* ≤0.05

4. Discussion

Primary dysmenorrhea, is one of the most common gynecologic disorders affecting more than half of menstruating women that interferes with daily activities. Egyptian young girls are not preferring to use medication for dysmenorrhea as they believe that it may affect fertility or causing some side effect. On the other hand some experimental studies have found alternative methods such as acupuncture, acupressure, stimulation, massage, and aromatherapy to be fairly effective for treatment of dysmenorrhea. Aromatherapy is the most widely used complementary therapy in nursing practice, it uses essential oils from fragrant plants to relieve health problems such as dysmenorrhea and improve quality of life. There is a great deal of debate over the efficacy of aromatherapy. Some argue that claims for therapeutic value or benefit outweigh the scientific evidence. This requires from nurses to move forward with research that will support claims on either side of the debate regarding use and benefit of aromatherapy as one modality of CAM.**.** [13,14]

On investigating the effect of aromatherapy using abdominal massage with peppermint oil (study group 1) versus ginger oil (study group 2) on primary dysmenorrhea among adolescent girls. The result of the present study revealed that the severity of PD (menstrual pain) were significantly changed from either moderate or severe before the intervention to absence or mild among both peppermint and ginger groups compared to control group, one and two months after the intervention. This result is congruent with Ozgoli *et al.* (2009) [15] who found that Ginger inhibits cyclooxygenase and lipooxygenase pathways in prostaglandin that leads to reduction in leukotriene and prostaglandins and consequently pain relief. Moreover Tate (1997) [16] also agree with this result he mentioned that menthol and methyl salicylate are the main active ingredients of peppermint. It have anti-spasmodic actions, with calming effects on the muscles of the uterus. They also have powerful analgesic (pain-killing) properties, which are mediated, in part, through activation of kappa-opioid receptors, which help block pain signal transmission.

As regarding the effect of aromatherapy using abdominal massage on the site/ location of dysmenorrhea.The result of the present study revealed that the majority of control group were still complaining from menstrual pain at lower abdomen that radiated to the back and thighs at one and two months after the intervention compared to about two-fifths of aromatherapy groups (peppermint and ginger). This result is in line with the study of Kim *et al.* (2011) [17] they stated that the intensity and site of menstrual cramps on both the first and second days of menstruation was significantly lower by a little more that 50% in the aromatherapy group than in the placebo group or the control group.

Concerning the duration of primary dysmenorrhea among adolescent girls. The result of this study show that, one and two months after the intervention the duration of dysmenorrhea lasted only for less than 18 hours among the vast majority of the peppermint group compared to more than half of the ginger group and more than two –fifths among the control group. The difference was a statistically significant. This in line with the result of Han *et al.*(2006) [10] they mentioned that the level and duration of menstrual pain and the amount of menstrual bleeding were significantly lower in the aromatherapy group than in the placebo group. On the other hand Rahnama *et al.*(2012) [6] mentioned that treatment of primary dysmenorrhea in students with ginger had a statistically significant effect on relieving intensity and duration of pain.

The result of the present study shows that primary dysmenorrhea symptoms such as: Nausea and vomiting & Dizziness and fatigue and Headache were significantly improved among study group 2 (who receive aromatherapy massage with ginger oil) than the peppermint group and control group, one and two months after intervention. This result goes hand in hand with Jenabi (2013) [18] who reported that, the uses of ginger as a digestive aid can be largely attributed to the presence of gingerols and shogaols, which help neutralise stomach acids, enhance the secretion of digestive juices and tone the muscles of the digestive tract. Moreover Abascal et al. (2009) [19] mentioned that the active ingredient in ginger is terpenes and an oleoresin, which is called ginger oil are responsible for its antiseptic qualities, lymph-cleansing, circulation-stimulating.

As regarding Nausea and vomiting that associated with primary dysmenorrhea, a sizable proportion of ginger group reported absence or presence of mild symptoms than peppermint group and control group, one and two months after the intervention. This results is supported by Haniadka et al.(2012) [20] he mentioned that ginger has anti-emetic effects. The exact mechanism responsible for the anti-emetic effects of ginger is unknown; however, the ginger phytochemicals, especially 6-gingerol, 8-gingerol, 10-gingerol, and 6-shogaol, may function as a 5-hydroxytryptamine (5-HT3) antagonist, NK1 antagonist, antihistaminic, and possess prokinetic effects. While, Lin Lua et al.(2012)(21) found in his result that the inhaled vapor of ginger essential oils not only reduced the incidence and severity of nausea and vomiting but also decreased antiemetic requirements and consequently improved patient satisfaction.

The result of the present study revealed that, the study group 2 who receive massage by ginger oil exhibit less dizziness and/or fatigue than peppermint group or control group after intervention. The difference was statistically significant. This result was in line with the study that performed by Ozgoli et al. (2009) [15] they concluded that active agents of ginger oil are responsible for its antiseptic qualities and lymph-cleansing. Ginger also improves blood circulation, hence thought to improve fatigue and dizziness too.

In the same issue, headache was significantly improved among ginger group than peppermint group and control group, one and two months after the intervention. This in line with Abascal et al.(2009) [19] who conducted a study about the mechanism of action of ginger on headache, he found that ginger can block the effects of prostaglandin - a substance that causes inflammation of the blood vessels in the brain, which leads to migraine

On the other hand the picture was different as there was statistically significant difference between both groups in favor of the study group 1 who receive massage by peppermint oil, one and two months after the intervention in relation to anorexia, diarrhea and/or constipation and level of mood that associated with dysmenorrhea. This result goes hand in hand with Cappello et al. (2007) [7] who reported that, peppermint was used effectively in the majorities of cases for the management of symptoms associated with dysmenorrhea. It can alleviate the digestive symptoms of the premenstrual syndrome as its menthol has a direct antispasmodic activity on the smooth muscle of the digestive tract through calcium antagonist activity. Again, relevant literatures indicate that peppermint oil can decrease gas and flatulence by relaxing the lower esophageal sphincter, thereby equalizing the intraluminal pressures between the stomach and esophagus. [22,23]

Aromatherapy with peppermint in this study had a significant positive influence on the level of mood among compared ginger control groups. The results of this study follow a similar pattern to the findings of Moss et al (2008) [24] who found that peppermint was found that peppermint enhance memory, increased alertness and has mood-elevating properties. Also, Herz (2009) [25] mentioned that aromatherapy usually uses aromatic essential oils, which are extracted by distillation from plants to achieve physiological and psychological health. The essential oil was shown to have a positive effect on both levels of mood and relaxation over a short-term period and consistent improvement also shown.

Concerning water retention the result of this study revealed that there was no significant difference between the study groups 1& 2 and control group regarding water retention that associated with dysmenorrhea among adolescent' girls before and after the intervention. This result was disagree with Kim et al. (2011) [17] they mentioned that, aromatherapy has been defined as "the controlled use of essential oils to maintain and promote physical and mental well being.

As regarding the effect of dysmenorrhea symptoms on the daily life activities. The result of the present study revealed that most significant improvement was observed in academic productivity followed by social life activities and home responsibilities among aromatherapy groups (peppermint and ginger) groups compared to control group. This result was agree with Herz (2009) [25] who mentioned that aromatherapy is the most widely used complementary therapy in nursing practice and uses essential oils from fragrant plants to relieve health problems and improve quality of life in general.

Conclusion and Recommendations

Based on the finding of the present study, it can be concluded that aromatherapy by either peppermint or ginger oils is effective in improving the severity of menstrual pain and its location as well as daily life activities of adolescent girls. Peppermint is effective in improving the duration of pain, anorexia, diarrhea and/or constipated and level of mood. While ginger is effective in relieving nausea /vomiting, dizziness/ fatigue and headache. In the light of the study results, it was **recommended that** complementary therapy especially aromatherapy should be incorporated in nursing practice especially provided as a pain relief measures to adolescent girls suffering of primary dysmenorrhea, and its related symptoms. Also, further researches are needed to investigate the efficacy of aromatherapy massage on reducing other menstrual disorders among adolescent girls.

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11/2/2013