



# Menstrual Discomforts and the Treatment Preferred by University Students

Sivadasan Shalini<sup>a\*</sup>, Sundar Hemalatha<sup>a</sup>, Wong Chui Ting<sup>a</sup>, Maniam Yoshita<sup>a</sup>, Balasubramanian Ganesh Pandian<sup>a</sup>, Abdul Nazer Ali<sup>a</sup>, Kasi Marimuthu<sup>b</sup> and Veerasamy Ravichandran<sup>a</sup>

<sup>a</sup>Faculty of Pharmacy, AIMST University, Jalan Bedong, Semeling-08100, Bedong, Kedah Darul Aman, Malaysia.

<sup>b</sup>Faculty of Applied Sciences, AIMST University, Semeling-08100, Bedong, Kedah Darul Aman, Malaysia.

## ABSTRACT

**Background:** Menstrual disorders are one of the major problems faced by women all around the world and may have considerable psychological and physical consequences in student community and contribute to absenteeism. **Objective:** This study was conducted to investigate student's experience of and their response to menstrual symptoms and also to understand the impact of the respondents' study background on the treatment preferred for the menstrual discomforts. **Methods:** The survey was carried out using a pre-validated questionnaire consisting 29 questions, organized into two sections viz., the first section includes 10 items on the demographic details; second section includes 19 questions related to menstrual problems and the treatment preferred. **Results:** A total of 592 questionnaires were returned by the participants giving a response rate of 70% and only 569 questionnaires were completely filled. Among the participants, 34.97% of students responded to have irregular menstrual cycle. The participants responded that menstrual discomforts was a reason for them to avoid physical exercise (64.0%), feel depressed (54.8%), absent from classes (20.0%) and also that it affected work ability (44.1%), academic activities (32.3%), social relationship (30.2%). **Conclusion:** In this study, the most common discomfort experienced by the students was pain cramps leading to usage of pain killers as their main choice. Among alternative medicines, Chinese medicine was their most preferred choice of treatment, whereas in home remedies, raw ginger was their choice. An educational intervention regarding menstrual problems and the importance to seek medical advice can help these students to be concerned on their health.

**Key words:** Alternative medicines, Home remedies, Menstrual discomforts, Preferred, Students, Treatment.

## INTRODUCTION

Menstruation is a normal physiological process in woman of reproductive age. Often it is referred to cause physical discomfort and psychological upset. Menstrual disorders are one of the major problems faced by women all around the world and are generally perceived as minor health concerns and it is a reason for increasing 1% of gynecological visit. Menstruation-related disturbances may have considerable psychological and physical consequences in student community. These conditions contribute to absenteeism by students and can give rise to the problems faced by these adolescents and their families during this difficult stage of development.<sup>1</sup>

There are many types of menstrual disorders such as oligomenorrhea, hypomenorrhea, menorrhagia, metrorrhagia, dysmenorrhea, pre-menstrual syndrome (PMS), amenorrhea and polymenorrhea.<sup>2</sup>

Common menstrual disorders include heavy flow (menorrhagia), unusually light (hypomenorrhea), unusually frequent (polymenorrhea), unusually infrequent (oligomenorrhea) and unusually painful (dysmenorrhea).<sup>3</sup> Delayed, irregular, painful, and heavy menstrual bleeding are common and are the leading reasons for physician visits by adolescents.<sup>4</sup> Premenstrual syndrome greatly affects daily life activity of young women especially the student population. These disorders may cause significant anxiety.<sup>5</sup> Many reasons have been deduced as the factors responsible for the low public attention attracted to menstrual disorder and discomfort. Some women see menstruation as a 'taboo' and subject not to be discussed publicly and could cause distress.<sup>6-8</sup>

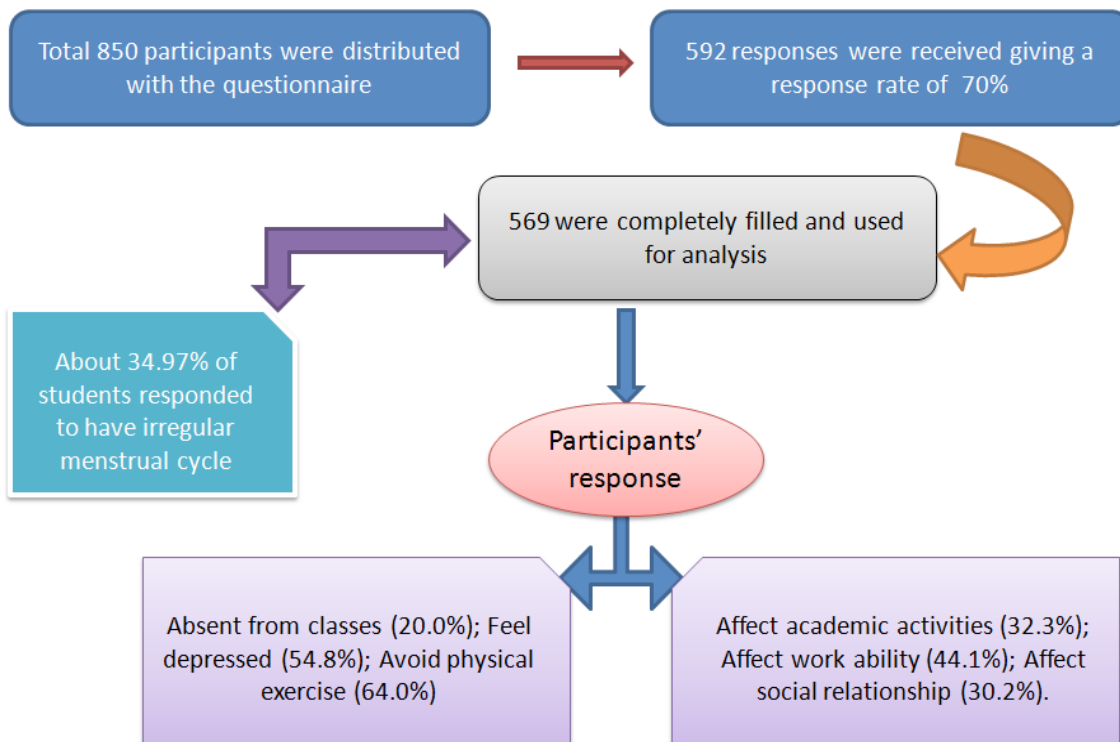
Menstrual patterns influenced by a wide variety of factors such as eating disorder, malnutrition, and intensive physical activity associated with the irregular menstrual cycles are experienced by students nowadays.<sup>9</sup> These irregularities in menstrual cycle directly influence the rise of menstrual disorders.<sup>10</sup> Several studies have investigated the prevalence of menstrual disorders among student population. Studies have shown a high prevalence of dysmenorrhea and menstrual irregularity among students and that these problems affected the women's social activities and school attendance.<sup>11,12</sup> Several

### Corresponding Author:

Mrs. Shalini Sivadasan

Lecturer, Faculty of Pharmacy, AIMST University,  
Semeling 08100, Bedong, Kedah Darul Aman, Malaysia.  
Ph no: 006-04-4298010, Fax no: 006-044298007  
E-mail: shaliniravichandran11@gmail.com

DOI: 10.5530/PTB.1.3.4



Graphical Abstract

studies were conducted to evaluate the factors and related variables associated with menstrual disorders and have reported that relationships with diet and eating disorders,<sup>13,14</sup> exercise and BMI,<sup>15-17</sup> stress<sup>18,19</sup> and chronic diseases.<sup>20-23</sup>

Those students who suffer from irregular menstrual cycle may have a significant impact on the physical and social health.<sup>6</sup> The menstrual disorders frequently affect the quality of life in adolescents, especially those who suffer dysmenorrhea and heavy menstruation.<sup>24</sup> This study was conducted with the objective to investigate student's experience of and their response to menstrual symptoms; and also to understand the impact of the respondent's study background on the treatment preferred for their menstrual symptoms.

## METHODS

This study was conducted for a period of six months using self administered questionnaire, among students from various disciplines at a private university. The questionnaire was developed using information from previous literatures consisting 29 questions, organized into two sections viz., the first section includes 10 items on the demographic details; second section includes 19 questions related to menstrual cycle and the treatments preferred. This questionnaire was pre-validated by five lecturers from the Faculty of Pharmacy, and a gynecologist from Faculty of Medicine, of the university, who have sound knowledge on the topic and their suggestions regarding the relevance, clarity, and appropriateness of the items included in the questionnaire were taken into consideration. The reliability of the questionnaire was tested by administering the questionnaire to a sample of 15 students who did not participate in the main study and the Cronbach alpha value was found to be 0.78. The study was approved by the Institutional research and ethical committee.

The study was conducted after obtaining the permission from the head of each faculty. The participants were explained on the objectives of the study and their consent was duly obtained. The female students from various disciplines between the age limit of 16-35 years were included in the study. All those students who were married were excluded from the study. The pre-validated questionnaire

was distributed to those participants who were present in their lecture rooms during the study period and also who were willing to participate in the study. The average time given to the participants to complete the questionnaire was 15 to 20 minutes. The received survey data were analyzed using SPSS statistical software package version 20. Descriptive statistical analyses such as frequencies and percentages were used to represent the respondent's demographic information.

## RESULTS

The pre-validated questionnaire was distributed to a total of 850 participants irrespective of their course of study, out of which 592 questionnaires were returned back giving a response rate of 70% and only 569 questionnaires were completely filled and were used for the analysis. Of the 569 participants, 137 were in the age range of 17-19, 331 were in the age range of 20-22, 93 were in the age range of 23-25, and 8 were in the age of 26-28. Based on the course of study, it was found that there were participants studying in Foundation studies (120), Dentistry (100), Pharmacy (89), Medicine (83), Biotechnology (71), Business (57), Physiotherapy (22), Nursing (18) and Engineering (9). Among the participants, 349 were Chinese, 194 Indians, 16 Malay and 5 from other races. It was also found that among the participants 29 were vegetarians and 540 were non-vegetarians.

### Analysis of menstrual history and treatment preferred

It was found that significantly most of the students (61.7%,  $P < 0.05$ ) attained menarche between 10-12 years. Among the 569 participants, 65.0% responded that they experience regular menstrual cycle and 35.0% responded that they experience irregular menstrual cycle. Of those who responded to have irregular menstrual cycle, the highest (75.4%) were among the Business students followed by Medicine students (48.2%).

For the length of the menstrual cycle experienced by the participants, 70.3% ( $n=569$ ) responded that their menstrual cycle is between 21-35 days while 23.0% responded that their menstrual cycle is less

**Table 1: Drugs administered by participants**

Drugs	Total N = 569	P value
Hormonal Preparation	26 (4.6%)	0.389
Coagulation Modifiers	12 (2.1%)	0.695
Pain Killers	116 (20.4%)	0.046
Supplements	59 (10.4%)	0.533
Others	12 (2.1%)	0.380
Not sure	17 (3.0%)	0.191

than 21 days and 6.7% responded that it is more than 35 days. Of those who responded that it is less than 21 days, the highest were among Business students (54.4%). Among those who responded that it is more than 35 days, the highest were among Pharmacy students (11.2%). About 20.6% responded to have a family history of menstrual disorder.

For the question on whether menstrual cycle interfere the participants' daily activities, 62.4% (n=569) responded 'Yes' of which the highest were Foundation students (22.9%) whereas the lowest were Business students (1.40%). It was found that 77.3% among the Physiotherapy students, 67.6% among Biotechnology students, 66.7% among Engineering and Nursing students, 62% among Dentistry students, 59.7% among Business students, 59.2 among Foundation students, 57.3% among Pharmacy students and 45% among medicine students responded that their menstrual cycle did not influence on their daily activities.

The results showed that 44.1% responded that menstrual cycle affects their work ability, 32.3% responded that it affects academic activities, 30.2% responded that it affects social relationship. About 64.0% of participants responded that they avoided physical exercise,

54.8% responded that they felt depressed, 20.0% responded that they were absent from classes during their menstrual cycle, thus affecting their daily activities.

For the symptoms experienced during menstruation, 50.3% (n=569) participants responded that they experience cramps, followed by 48.7% participants experience anger, 39.4% participants experience loss of appetite, 33.2% experience sleep disturbance, 29.9% participants feel irritated, 26.7% participants get headache, 24.6% participants experience dizziness, 11.1% participants experience nausea, 10.5% participants experience vomiting and 7.4% participants experienced other types of symptoms. About 83% responded that these symptoms disappeared after their menstruation.

The results showed that among those respondents who regularly take balanced diet, the highest (74%) were Dentistry students and lowest (16.9%) were Nursing students; for those who skip meals, the highest response (66.7%) were Business students and lowest (11.1%) were Nursing students; for those who responded that their diet is rich in fresh food, vegetables, and wholegrain, the highest (32.5%) were Foundation students and the lowest were Dentistry students (6%) and finally for those who responded that they regularly take junk food, the highest response (27.3%) were Physiotherapy students and the lowest response (4.5%) were Pharmacy students.

For the question on the types of menstrual discomforts experienced by the participants, 55.7% (n=569) participants responded of having pain cramps during menstruation, followed by 41.8% participants having infrequent menstruation, 33.7% participants having extremely light menstrual flow, 30.8% responded that they had absence of regular menstrual period, 26.4% responded that they had abnormally heavy and prolonged discharge, and 19.5% responded that they had menstrual cycle less than 21 days and irregular.

About 86.5% (n=492) responded that they have not consulted the doctor for menstrual discomforts in the prior 12 months. And 75.4% (n=569) responded that they do not take any medications to treat their menstrual discomforts if any. However, it was found that about 142 participants take some medications for their menstrual problems of which the highest administered were pain killers (Table 1).

Among those who took pain killers, it was found that the highest were Physiotherapy students (36.4%), whereas for supplements, the

**Table 2: Participants who do not consult doctor and who take alternative or traditional medicines**

Course of study	No of participants who do not consult a doctor or a pharmacist to take their medications (N = 569)	No of participants who take alternative or traditional medicines (N = 569)
Foundation	113 (19.9%)	20 (3.51%)
Medicine	73 (12.8%)	18 (3.16%)
Dentistry	88 (15.5%)	27 (4.75%)
Pharmacy	75 (13.2%)	31 (5.45%)
Biotechnology	60 (10.5%)	18 (3.16%)
Nursing	14 (2.5%)	4 (0.70%)
Physiotherapy	17 (3.0%)	7 (1.23%)
Engineering	7 (1.2%)	1 (0.18%)
Business	52 (9.1%)	16 (2.81%)
Total	499 (87.7%)	142 (25.0%)

highest were Nursing students (16.7%); for hormonal preparations, the highest were Nursing students (11.1%); for those who were not sure, the highest (11.1%) were Nursing students; for those who responded that they took coagulation modifiers, the highest (4.5%) were Physiotherapy students; and finally for those who responded that they took other drugs, the highest response (5.3%) were Business students. There was a significant difference between those taking painkillers with the other drugs ( $P < 0.05$ ).

It was found that 87.7% ( $n=569$ ) take medications for their menstrual discomforts without consulting the doctors or pharmacist of which the highest were Foundation students followed by Dentistry students (Table 2).

### Alternative or Traditional Medicines

About 75% ( $n=569$ ) participants responded that they take alternative or traditional medicines for menstrual discomforts of which, the highest were foundation students (17.6%) and the lowest were Engineering students (1.4%). (Table 2).

Table 3 shows the types of treatment that the participants take for their menstrual discomforts. The results showed that about 13.2% ( $n=569$ ) participants take Chinese medicine, followed by 10.7% take herbal remedies, 10% take home remedies and so on. The lowest choice was acupuncture (0.7%). The results showed that Chinese medicines were the most preferred type of treatment among the foundation students, dentistry students, pharmacy students, and nursing students for their menstrual discomforts. However, herbal remedies were most preferred by Medical and Physiotherapy students and home remedies were preferred by Biotechnology,

Nursing, Physiotherapy and Business students. Engineering students preferred modern drugs and dietary supplements for their menstrual discomforts. There is a significant difference between home remedies, dietary supplements and acupuncture among the disciplines ( $P < 0.05$ ).

The participants were asked the participant's preference on use of herbal remedies and home remedies for menstrual discomforts as it is easily available without consulting a doctor. Among the participants about 157 participants prefer herbal remedies and 105 prefer home remedies. For the herbal remedies, 36.9% ( $n=157$ ) of participants preferred ginger tea followed by 28.7% evening prime rose oil (Table 3). For the home remedies, the most preferred was raw ginger, 21% ( $n=105$ ) followed by 15.2% of participants preferred *aloe vera* and fenugreek (Table 3). In both herbal and home remedies, it was found that ginger was the most preferred one. There was a significant difference between the preference of sesame seeds and castor oil with the disciplines ( $P < 0.05$ ) as shown in Table 3.

For the factors affecting menstrual cycle, about 45.7% ( $n=569$ ) participants responded that there are many factors which affect menstrual cycle and 54.3% ( $n=569$ ) participants responded that there are no other factors that affect menstrual cycle. The highest percentage of participants, 51.7% ( $n=569$ ) responded that increased stress is the main factor affecting menstrual cycle. There is a statistically significant difference between the factors preferred as weight gain, increased stress, smoking, tea or coffee intake, frequent abortion, significant weight loss, poor nutrition, over exercising, excessive alcohol use, drug usage and other factors among the disciplines ( $P < 0.05$ ) (Table 4).

**Table 3: Types of treatment taken for menstrual discomforts**

Traditional Medicines	1 N=120	2 N=83	3 N=100	4 N=89	5 N=71	6 N=18	7 N=22	8 N=9	9 N=57	Total N=569	P Value
Home remedies	5 (4.2%)	8 (9.6%)	6 (6%)	16 (18%)	11 (15.5%)	2 (11.1%)	2 (9.1%)	0 (0%)	7 (12.3%)	57 (10%)	0.024
Yoga & Meditation	6 (5%)	2 (2.4%)	4 (4%)	5 (5.6%)	2 (2.8%)	0 (0%)	0 (0%)	0 (0%)	2 (3.5%)	21 (3.7%)	0.861
Modern Drugs	5 (4.2%)	7 (8.4%)	7 (7%)	3 (3.4%)	3 (4.2%)	0 (0%)	1 (4.5%)	1 (11.1%)	4 (5.6%)	31 (5.5%)	0.635
Homeopathic Medicines	0 (0%)	2 (2.4%)	2 (2%)	0 (0%)	1 (1.4%)	1 (5.6%)	0 (0%)	0 (0%)	2 (3.5%)	8 (1.4%)	0.402
Dietary Supplements	0 (0%)	6 (7.2%)	11 (11%)	1 (1.1%)	7 (9.9%)	0 (0%)	0 (0%)	1 (11.1%)	1 (1.8%)	27 (4.8%)	0.003
Chinese Medicines	14 (11.7%)	8 (9.6%)	18 (18%)	20 (22.5%)	8 (11.3%)	2 (11.1%)	1 (4.5%)	0 (0%)	4 (5.6%)	75 (13.2%)	0.062
Acupuncture	0 (0%)	0 (0%)	1 (1%)	0 (0%)	3 (4.2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4 (0.7%)	0.049
Ayurvedic Medicines	4 (3.3%)	2 (2.4%)	2 (2%)	1 (1.1%)	1 (1.4%)	0 (0%)	0 (0%)	0 (0%)	2 (3.5%)	12 (2.1%)	0.868
Herbal Remedies	8 (6.7%)	9 (10.8%)	12 (12%)	15 (16.9%)	9 (12.7%)	1 (5.6%)	2 (9.1%)	0 (0%)	5 (8.8%)	61 (10.7%)	0.542
Others	1 (0.8%)	0 (0%)	2 (2%)	0 (0%)	2 (2.8%)	0 (0%)	0 (0%)	0 (0%)	1 (1.8%)	6 (1.1%)	0.686
<b>Herbal remedies preferred by participants</b>											
Black Cohosh	4 (2.5%)	2 (1.3%)	6 (3.8%)	2 (1.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (0.6%)	15 (9.6%)	0.421
Magnesium Supplements	2 (1.3%)	1 (0.6%)	2 (1.3%)	1 (0.6%)	3 (1.9%)	1 (0.6%)	0 (0%)	1 (0.6%)	2 (1.3%)	13 (8.3%)	0.504
Aromatherapy (rose oil)	3 (1.9%)	0 (0%)	3 (1.9%)	1 (0.6%)	0 (0%)	0 (0%)	1 (0.6%)	0 (0%)	2 (1.3%)	10 (6.4%)	0.509
Evening Prime Rose Oil	2 (1.6%)	2 (1.6%)	19 (12.1%)	12 (7.6%)	5 (3.2%)	1 (0.6%)	0 (0%)	1 (0.6%)	3 (1.9%)	45 (28.7%)	0.000

<b>Pycnogeol</b>	5 (3.2%)	0 (0%)	0 (0%)	1 (0.6%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	6 (3.8%)	0.172
<b>Ginger Tea</b>	8 (5.1%)	7 (4.5%)	12 (7.6%)	15 (9.6%)	7 (4.5%)	0 (0%)	1 (0.6%)	1 (0.6%)	7 (4.5%)	58 (36.9%)	0.288
<b>Others</b>	1 (0.6%)	0 (0%)	5 (3.2%)	3 (1.9%)	1 (0.6%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	10 (6.4%)	0.177
<b>Home remedies preferred by participants</b>											
<b>Aloe vera</b>	4 (3.8%)	0 (0%)	2 (1.9%)	3 (2.9%)	1 (1%)	0 (0%)	0 (0%)	1 (1%)	5 (4.8%)	16 (15.2%)	0.160
<b>Sesame Seeds</b>	1 (1%)	0 (0%)	0 (0%)	1 (1%)	2 (1.9%)	1 (1%)	0 (0%)	1 (1%)	5 (4.8%)	11 (10.5%)	0.001
<b>Fenugreek</b>	1 (1%)	3 (2.9%)	2 (1.9%)	5 (4.8%)	3 (2.9%)	1 (1%)	1 (1%)	0 (0%)	0 (0%)	16 (15.2%)	0.445
<b>Pepper</b>	2 (1.9%)	0 (0%)	1 (1%)	0 (0%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4 (3.8%)	0.441
<b>Hibiscus</b>	2 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (1.9%)	0.483
<b>Cinnamon with Milk</b>	3 (2.9%)	3 (2.9%)	2 (1.9%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (1%)	10 (9.5%)	0.817
<b>Castor Oil</b>	1 (1%)	0 (0%)	0 (0%)	1 (1%)	1 (1%)	2 (1.9%)	1 (1%)	0 (0%)	1 (1%)	7 (6.7%)	0.010
<b>Powdered Radish</b>	1 (1%)	1 (1%)	0 (0%)	0 (0%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	3 (2.9%)	0.895
<b>Raw Ginger</b>	1 (1%)	1 (1%)	4 (3.8%)	7 (6.9%)	1 (1%)	1 (1%)	0 (0%)	0 (0%)	7 (6.7%)	22 (21%)	0.051
<b>Unripe Papaya</b>	0 (0%)	1 (1%)	0 (0%)	2 (1.9%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)	2 (1.9%)	6 (5.7%)	0.630
<b>Tamarind</b>	0 (0%)	1 (1%)	0 (0%)	2 (1.9%)	1 (1%)	1 (1%)	0 (0%)	0 (0%)	2 (1.9%)	7 (6.7%)	0.302
<b>Marigold</b>	0 (0%)	2 (1.9%)	0 (0%)	2 (1.9%)	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	2 (1.9%)	7 (6.7%)	0.467
<b>Banana Flower with Curd</b>	0 (0%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (1%)	0.662
<b>Coriander Seeds</b>	0 (0%)	1 (1%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (1.9%)	0.806
<b>Parsley</b>	0 (0%)	0 (0%)	0 (0%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (1%)	2 (1.9%)	0.624
<b>Others</b>	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	-

1-Foundation, 2-medicine, 3-dentistry, 4-Pharmacy, 5-Biotechnology, 6-Nursing, 7-Physiotherapy, 8-Engineering, 9-Business.

www.ptbreports.org

**Table 4: Factors Affecting Menstrual Cycle**

Factors	1 N=120	2 N=83	3 N=100	4 N=89	5 N=71	6 N=18	7 N=22	8 N=9	9 N=57	Total N=569	P value
<b>Significant Weight Gain</b>	21 (17.5%)	20 (24.1%)	14 (14%)	19 (21.3%)	26 (36.6%)	7 (38.9%)	4 (18.2%)	1 (11.1%)	8 (14%)	120 (21.1%)	0.009
<b>Eating Disorders</b>	38 (31.7%)	32 (38.6%)	36 (36%)	35 (39.3%)	36 (50.7%)	8 (44.4%)	9 (40.9%)	3 (33.3%)	18 (31.6%)	215 (37.8%)	0.392
<b>Increased Stress</b>	41 (34.2%)	30 (36.1%)	59 (59%)	59 (66.3%)	50 (70.4%)	10 (55.6%)	15 (68.2%)	6 (66.7%)	24 (42.1%)	294 (51.7%)	0.000
<b>Smoking</b>	15 (12.5%)	16 (19.3%)	11 (11%)	11 (12.4%)	20 (28.2%)	6 (33.3%)	4 (18.2%)	1 (11.1%)	8 (14%)	92 (16.2%)	0.026
<b>Tea/Coffee</b>	18 (15%)	24 (28.9%)	17 (17%)	21 (23.6%)	24 (33.8%)	1 (5.6%)	6 (27.3%)	2 (22.2%)	12 (21.1%)	125 (22%)	0.071



<b>Frequent Abortion</b>	12 (10%)	17 (20.5%)	14 (14%)	15 (16.9%)	22 (31%)	7 (38.0%)	5 (22.7%)	4 (44.4%)	8 (14%)	104 (18.3%)	0.002
<b>Significant Weight Loss</b>	12 (10%)	21 (25.3%)	15 (15%)	20 (22.5%)	26 (36.6%)	3 (16.7%)	8 (36.4%)	2 (22.2%)	11 (19.3%)	118 (20.7%)	0.001
<b>Poor Nutrition</b>	33 (27.5%)	23 (27.7%)	46 (46%)	37 (41.6%)	35 (49.3%)	8 (44.4%)	10 (45.5%)	4 (44.4%)	16 (28.1%)	212 (37.3%)	0.033
<b>Over exercise</b>	7 (5.8%)	11 (13.3%)	12 (12%)	18 (20.2%)	18 (25.4%)	5 (27.8%)	3 (13.6%)	1 (11.1%)	7 (12.3%)	82 (14.4%)	0.000
<b>Excessive Alcohol Use</b>	10 (8.3%)	32 (38.6%)	11 (11%)	16 (18%)	20 (28.2%)	2 (11.1%)	5 (22.7%)	1 (11.1%)	7 (12.3%)	104 (18.3%)	0.017
<b>Drug Use</b>	12 (10%)	17 (20.5%)	21 (21%)	21 (23.6%)	29 (40.8%)	6 (33.3%)	6 (27.3%)	4 (44.4%)	11 (19.3%)	127 (22.3%)	0.000
<b>Others</b>	2 (1.7%)	3 (3.6%)	2 (2%)	5 (5.6%)	10 (14.1%)	2 (11.1%)	1 (4.5%)	0 (0%)	0 (0%)	25 (4.4%)	0.003
<b>Seeking medical advice</b>											
<b>Yes</b>	78 (65%)	27 (32.5%)	55 (55%)	53 (60%)	41 (57.7%)	9 (50%)	14 (63.6%)	7 (77.8%)	40 (70.2%)	324 (56.9%)	
<b>No</b>	42 (35%)	56 (67.5%)	45 (45%)	36 (40%)	30 (42.3%)	9 (50%)	8 (36.4%)	2 (22.2%)	17 (29.8%)	245 (43.1%)	
<b>Reasons for not seeking medical attention</b>											
<b>Considered personal</b>	13 (10.8%)	11 (13.3%)	11 (11%)	18 (20.2%)	13 (18.3%)	4 (22.2%)	8 (36.4%)	0 (0%)	5 (8.8%)	83 (14.6%)	0.024
<b>Highly secretive</b>	7 (5.8%)	6 (7.2%)	4 (4%)	5 (5.6%)	6 (8.5%)	2 (11.1%)	3 (13.6%)	0 (0%)	3 (5.3%)	36 (6.3%)	0.708
<b>Fear</b>	8 (6.7%)	9 (10.8%)	8 (8%)	8 (9%)	6 (8.5%)	1 (5.6%)	4 (18.2%)	0 (0%)	4 (7%)	48 (8.4%)	0.795
<b>Take self-medication</b>	14 (11.7%)	14 (16.9%)	18 (18%)	20 (22.5%)	12 (16.9%)	2 (11.1%)	7 (31.8%)	0 (0%)	6 (10.5%)	93 (16.3%)	0.749
<b>Take home remedies</b>	12 (10%)	25 (30.1%)	18 (18%)	21 (23.6%)	9 (12.7%)	3 (16.7%)	9 (40.9%)	0 (0%)	3 (5.3%)	100 (17.6%)	0.001
<b>Not necessary</b>	31 (25.8%)	39 (47%)	31 (31%)	26 (29.2%)	16 (22.5%)	6 (33.3%)	9 (40.9%)	1 (11.1%)	9 (15.8%)	168 (29.5%)	0.163
<b>Others</b>	4 (3.3%)	7 (8.4%)	1 (1%)	1 (1.1%)	3 (4.2%)	2 (11.1%)	0 (0%)	0 (0%)	0 (0%)	18 (3.2%)	0.273

1-Foundation, 2-medicine, 3-dentistry, 4-Pharmacy, 5-Biotechnology, 6-Nursing, 7-Physiotherapy, 8-Engineering, 9-Business.

Table 4 shows the participants' preference to seek medical attention. Only 56.9% (n=569) responded that they would seek medical attention in future. It was found that among those who preferred to seek medical attention in future, the highest were among the Engineering students (77.8%) followed by Business students (70.2%). Among those who preferred not to seek medical attention, the highest was Medicine students (67.5%) followed by Nursing students (50.0%). For the reasons of not seeking medical advice, the highest percentage, 29.5% (n=569) of participants responded that it is because they consider it not necessary, followed by 17.6% of participants responded that they prefer taking home remedies, 16.3% of participants preferred self medication, 14.6% of participants considered it as their personal problem. Of those who considered that it is not necessary to seek medical advice, the highest were Medicine (47%) and Physiotherapy students (40.9%). The results showed statistically significant difference ( $P < 0.05$ ) among those considering it as their personal problem and those taking home remedies when compared with the different disciplines of study (Table 4).

Table 4 shows the students preferred treatment for menstrual discomforts in future, if any. The most preferred choice of treatment was home remedies (36.7%), followed by yoga and meditation (34.4%), dietary supplements (33.4%) and so on. It was found that the highest percentage of students (55.6%) who chose home remedies was engineering students. It was found that highest per-

centage of students who chose home remedies (55.6%), yoga and meditation (55.6%), and dietary supplements (66.7%) as their choice of treatment in future was engineering students. The results showed statistically significant difference for dietary supplements, Chinese medication, acupuncture and other treatments preferred by students ( $P < 0.05$ ) (Table 5). Participants were asked on their choice of home remedies which will be preferred for their menstrual discomforts if any, in future as it is readily available at home (Table 5). It was found that most preferred home remedies were *aloe vera* (32.86%) followed by raw ginger (22.67%).

Finally the participants were asked on whether there is a need to inform the doctors about the home remedies if they take any. Table 6 shows the perception of the participants on whether it is necessary to inform the doctors about the home remedies that they take and 69.24% of participants responded 'yes'. However, 83.33% of foundation students had the perception that it is not necessary.

## DISCUSSION

The present study was conducted to determine the menstrual discomforts experienced by university students with relation to their dietary habits, factors that affect their menstrual cycles and how it affects their daily activities. The study findings showed that the mini-

**Table 5: Treatment preferred in future for menstrual discomforts if any**

Preferred Treatment	1 N=120	2 N=83	3 N=100	4 N=89	5 N=71	6 N=18	7 N=22	8 N=9	9 N=57	Total N=569	P Value
Home remedies	35 (29.2%)	24 (28.9%)	44 (44%)	42 (47.2%)	24 (33.8%)	8 (44.4%)	10 (45.5%)	5 (55.6%)	17 (29.8%)	209 (36.7%)	0.056
Yoga & Meditation	44 (36.7%)	36 (43.4%)	28 (28%)	31 (34.8%)	22 (31%)	5 (27.8%)	6 (27.3%)	5 (55.6%)	18 (31.6%)	195 (34.3%)	0.055
Modern Drugs	25 (20.8%)	22 (26.5%)	40 (40%)	33 (37.1%)	23 (32.4%)	6 (33.3%)	5 (22.7%)	3 (33.3%)	13 (22.8%)	170 (29.9%)	0.095
Homeopathic Medicines	10 (8.3%)	8 (9.6%)	8 (8%)	7 (7.9%)	13 (18.3%)	2 (11.1%)	3 (13.6%)	2 (22.2%)	6 (10.5%)	59 (10.4%)	0.295
Dietary Supplements	23 (19.2%)	19 (23%)	46 (46%)	47 (52.8%)	31 (43.7%)	4 (22.2%)	6 (27.3%)	6 (66.7%)	8 (14%)	190 (33.4%)	0.000
Chinese Medicines	15 (12.5%)	23 (27.7%)	35 (35%)	38 (42.7%)	17 (23.9%)	0 (0%)	4 (18.2%)	1 (11.1%)	16 (28.1%)	149 (26.2%)	0.000
Acupuncture	4 (3.3%)	5 (6%)	6 (6%)	2 (22.5%)	26 (36.6%)	3 (16.7%)	2 (9.1%)	1 (11.1%)	8 (14%)	57 (10%)	0.000
Ayurvedic Medicines	16 (13.3%)	20 (24.1%)	34 (34%)	4 (4.5%)	16 (22.5%)	3 (16.7%)	4 (18.2%)	1 (11.1%)	8 (14%)	106 (18.6%)	0.108
Herbal Remedies	21 (17.5%)	18 (21.7%)	34 (34%)	38 (42.7%)	22 (31%)	4 (22.2%)	9 (40.9%)	1 (11.1%)	16 (28.1%)	163 (28.6%)	0.092
Others	8 (6.7%)	10 (12%)	4 (4%)	0 (0%)	7 (10%)	1 (5.6%)	2 (9.1%)	0 (0%)	2 (3.5%)	34 (6%)	0.019
<b>Preferred Home Remedies in Future</b>											
<i>Aloe vera</i>	37 (30.83%)	18 (21.69%)	41 (41%)	32 (35.96%)	30 (42.25%)	6 (33.33%)	5 (22.73%)	3 (33.33%)	15 (26.32%)	187 (32.86%)	0.457
Sesame seeds	16 (13.33%)	7 (8.43%)	21 (21%)	18 (20.22%)	15 (21.13%)	0 (0%)	4 (18.18%)	4 (44.44%)	14 (24.56%)	99 (17.4%)	0.079
Fenugreek	7 (5.83%)	12 (14.46%)	6 (6%)	12 (13.48%)	10 (14.08%)	2 (11.11%)	2 (9.09%)	0 (0%)	3 (5.26%)	54 (9.49%)	0.249
Pepper	8 (6.67%)	7 (8.43%)	6 (6%)	6 (6.74%)	11 (15.49%)	1 (5.56%)	2 (9.09%)	2 (22.2%)	5 (8.77%)	48 (8.44%)	0.261
Hibiscus	8 (6.67%)	9 (10.84%)	8 (8%)	7 (7.87%)	7 (9.86%)	4 (22.22%)	1 (4.55%)	0 (0%)	8 (14.04%)	52 (9.14%)	0.155
Cinnamon with milk	21 (17.5%)	10 (12.05%)	16 (16%)	15 (16.85%)	10 (14.08%)	2 (11.11%)	1 (4.55%)	4 (44.44%)	9 (15.79%)	88 (15.47%)	0.190
Castor oil	3 (2.5%)	12 (14.46%)	5 (5%)	4 (4.49%)	7 (9.86%)	2 (11.11%)	0 (0%)	1 (11.11%)	3 (5.26%)	37 (6.50%)	0.541
Powdered raddish seeds	7 (5.83%)	4 (4.2%)	5 (5%)	2 (2.25%)	3 (4.23%)	0 (0%)	2 (9.09%)	0 (0%)	3 (5.26%)	26 (4.57%)	0.872
Raw ginger	24 (20%)	20 (24.10%)	20 (20%)	29 (32.58%)	18 (25.35%)	2 (11.1%)	0 (0%)	4 (44.44%)	12 (21.05%)	129 (22.67%)	0.164
Unripe papaya	13 (10.83%)	11 (13.25%)	12 (12%)	11 (12.36%)	7 (9.86%)	3 (16.67%)	7 (31.82%)	3 (33.33%)	7 (12.28%)	74 (13.01%)	0.194
Tamarind	9 (7.5%)	7 (8.43%)	7 (7%)	9 (10.11%)	7 (9.86%)	2 (11.11%)	0 (0%)	3 (33.33%)	5 (8.77%)	49 (8.61%)	0.367
Marigold	8 (6.67%)	8 (9.64%)	10 (10%)	5 (5.62%)	9 (12.68%)	1 (5.56%)	1 (4.55%)	1 (11.11%)	5 (8.77%)	48 (8.44%)	0.716
Banana flower with curd	8 (6.67%)	5 (6.02%)	10 (10%)	7 (7.87%)	4 (5.63%)	1 (5.56%)	0 (0%)	0 (0%)	7 (12.28%)	42 (7.38%)	0.672
Coriander seeds	2 (1.67%)	4 (4.2%)	8 (8%)	6 (6.74%)	6 (8.45%)	1 (5.56%)	0 (0%)	2 (22.22%)	5 (8.7%)	34 (5.98%)	0.177
Parsley	6 (5%)	25 (30.12%)	10 (10%)	6 (6.74%)	4 (5.63%)	1 (5.56%)	1 (4.55%)	1 (11.11%)	4 (7.02%)	58 (10.19%)	0.962
Others	0 (0%)	0 (0%)	3 (3%)	1 (1.12%)	1 (1.41%)	0 (0%)	1 (4.55%)	0 (0%)	3 (5.26%)	9 (1.58%)	0.573

1-Foundation, 2-medicine, 3- dentistry, 4-Pharmacy, 5-Biotechnology, 6-Nursing, 7-Physiotherapy, 8-Engineering, 9-Business

**Table 6: Do you think it is necessary to inform the doctors about taking home remedies?**

Inform doctors about home remedies that you take	1 N=120	2 N=83	3 N=100	4 N=89	5 N=71	6 N=18	7 N=22	8 N=9	9 N=57	Total N=569
Yes	20 (16.67%)	70 (84.34%)	82 (82%)	74 (83.14%)	65 (91.55%)	16 (88.89%)	17 (77.27%)	9 (100%)	41 (71.93%)	394 (69.24%)
No	100 (83.33%)	13 (15.66%)	18 (18%)	15 (16.85%)	6 (8.45%)	2 (11.11%)	5 (22.73%)	0 (0%)	16 (28.07%)	175 (30.76%)

1-Foundation, 2-medicine, 3-dentistry, 4-Pharmacy, 5-Biotechnology, 6-Nursing, 7-Physiotherapy, 8-Engineering, 9-Business.

mum age of menarche was 7 years, while the maximum age of menarche was 18 years with an average mean of 12.8 years as similar to other studies<sup>10,24</sup> and Mohite and Mohite (2013)<sup>25</sup> and Karout *et al* (2012)<sup>26</sup> reported the mean age of menarche in their study as 14.1 years and 13.2 years respectively.

The study results showed that 65.03% of students reported to have regular menstrual cycle while 34.97% reported to have irregular menstrual cycle. Based on our study results, the duration between one menstrual cycle to another varies among students. For the length of less than 21 days, higher percentage of students was from the faculty of business, nursing and physiotherapy whereas for the duration of more than 35 days, higher percentage was from the faculty of nursing, engineering and pharmacy. Shabnam and Khyrunnisa (2011)<sup>27</sup> reported that irregular menstrual cycle was frequent among girls who had cycle length more than 35 days.

According to our study findings, students claimed having interferences in their daily activity and also that menstrual cycle affect their physical activities. Shabnam and Khyrunnisa (2011)<sup>27</sup> reported that working ability was affected to a moderate extend due to dysmenorrhea; however their results showed that it has a very low effect on the students. It is inconsistent to some findings as in Titilayo *et al* (2009)<sup>28</sup> but has consistent study with Houston *et al* (2006).<sup>11</sup>

Our study findings also show that students have responded to have experienced few symptoms during their menstrual cycle; however most of the participants agreed that their symptoms disappear after menstruation. The most experienced symptom was cramps followed by anger, loss of appetite, sleep disturbance and irritation. Shah *et al* (2013)<sup>29</sup> reported that in their study there was presence of nausea, vomiting, headache and dizziness as symptoms. Shabnam and Khyrunnisa (2011),<sup>27</sup> Amaza *et al* (2012),<sup>30</sup> Titilayo *et al* (2009)<sup>28</sup> also reported that the same symptoms were experienced by females in their study. About half of the participants responded that dietary habits has its impact on menstruation of which the highest were physiotherapy students followed by pharmacy, dental, medicine and so on. From the students' response it was found that about 63.44% of students take regular meals with a balanced diet followed by 18.63% of students who skip their meals, 16.87% take diet which is rich in fresh food, vegetables, and wholegrain, then 13% of take regular intake of food but with junk food. Bulik *et al* (2014)<sup>31</sup> reported that binge eating is more likely to report amenorrhea or oligomenorrhea, while Spears (2005)<sup>32</sup> said that non-acidic diet helps in the management of primary dysmenorrhea.

The results also found that more than half of the participants responded to have pain cramps as the discomfort experienced during menstruation, followed by infrequent menstruation, extremely light blood flow, absence of menstrual period of menstruation, abnormally heavy discharge and prolonged menstruation, and then bleeding at irregular intervals. Similarly Amaza *et al* (2012)<sup>30</sup> and Karout *et al* (2012)<sup>26</sup> reported that respondent experienced painful menstrual flow and 43.8% experienced irregular duration of menstruation respectively. Only 20.6% of students responded to have a family history of menstrual discomfort whereas it was reported by Charu *et al* (2012)<sup>30</sup> that family history of dysmenorrhea was present in 40% of participants in their study.

Majority of students (86.5%) in the present study do not consult a doctor for their menstrual discomfort of which highest were dentistry students followed by foundation, engineering, business, pharmacy, medicine, biotechnology, physiotherapy, and then nursing students. Only 13.5% of students responded that they consulted a doctor for their discomfort, out of which the highest were nursing students followed by physiotherapy, biotechnology, medicine, pharmacy, business, engineering, foundation and lastly dental students. This could be because of the reason that nursing students are much aware about the importance of the health issue. From the study, we can learn that the medications are mostly taken without consulting a doctor or a pharmacist. Chia *et al* (2013)<sup>33</sup> also reported lowest percentage (6%) of respondents did sought medical advice. It was also found that most of the participants (75.4%) do not take any medication for their menstrual discomfort. However, 24.6% of students responded that they do take medications for their menstrual discomfort. From our study, pain killers followed by supplement are the most taken drugs for the menstrual discomfort. Adetokunbo *et al* (2009)<sup>34</sup> reported that 25.4% used medication for menstrual pain. Pain killers were most taken by physiotherapy students. Pharmacy students are expected to have a better knowledge on the side effects of usage of pain killers. However they were the third highest group among those using pain killers. Nursing and medicine students were not among those who mostly used pain killers. Chi *et al* (2010)<sup>35</sup> reported that 75% of Hong Kong medical students took paracetamol and Zahradnika *et al* (2010)<sup>36</sup> reported that hormonal contraceptive was used for the management of dysmenorrhea.

It was also found out that 25% of students do take alternative or traditional medicines to treat their menstrual discomfort. The most preferred alternative medicines were Chinese medicine followed by herbal remedies and home remedies. However, all these alternative medicines were preferred mostly by the pharmacy students, for which the reason could be that most of the students studying pharmacy were Chinese students. Only few percentages of students took dietary supplement and acupuncture as their preferred treatment. Chia *et al* (2013)<sup>33</sup> reported in that 93% Hong Kong university students took Chinese medicines and 92% took dietary supplements which is contrast to this study. Agrawal and Venkat (2013)<sup>37</sup> said that traditional Chinese medicine were most commonly used for menstrual cycle problem and Mei and Jie (2009)<sup>38</sup> reported that acupuncture treatment is significantly superior for delayed menstrual cycle. Spears (2005)<sup>32</sup> concluded that herbal supplements are used for management of primary menorrhoea.

Ginger tea and raw ginger were preferred by the students as herbal remedies and home remedies respectively. Once again the highest number of students who chose ginger tea was pharmacy students and those who chose raw ginger were business students. However, there were students who chose *aloe vera*, fenugreek, etc as their choice of home remedies. Pushpangadan *et al* (2012)<sup>39</sup> reported that *aloe vera*, sesame seeds, fenugreek, pepper, hibiscus, raw ginger, unripe papaya, tamarind and parsley are used as home remedies for irregular menstrual disorder.

The results showed that almost half of the participants said that there are factors that affect the menstrual cycle of which increased stress was considered as the main factor of all that caused their irregular menstrual cycle followed by eating disorder and poor nutrition. Only



few students considered smoking and over exercising as some factors that contribute to irregular menstrual cycle. Gendal *et al* (2000)<sup>40</sup> reported that cigarette smoking, depression, and fluctuation in body weight may act as metabolic stress that contributes to the perpetuation of menstrual disturbance. Sood *et al* (2012)<sup>41</sup> also said that no clear association between psychological stress and menstrual abnormality and exercise habit contributed in menstrual irregularities. Mohite *et al* (2013)<sup>25</sup> discussed that poor diet contribute to menstrual problem and poor nutritional status contribute to menstrual problem. Fekr *et al* (2012)<sup>42</sup> reported that correct nutritional condition is important to prevent presence of amenorrhoea and oligomenorrhoea and also that exercise habit contribute in menstrual irregularities.

Our study findings also show that only about 50% of students agreed that they would seek medical advice if they experience any menstrual discomforts of which the highest were engineering students. However, it was found that medicine students were in the opinion not to seek medical advice for their menstrual discomfort. About more than a quarter of the participants chose the reason for not seeking medical attention as it was not necessary. The second and third highest reason was that they take home remedies and self medicate respectively and thus do not seek medical advice from doctors. Most of the participants' treatment preference was home remedies and yoga and medication. This could be due to their perception that these alternative medicines do not have side effects. The participants choice of treatment for menstrual discomfort if any, in future was home remedies of which *aloe vera*, raw ginger and sesame seeds. About 70% of students' perception was that it is necessary to inform to the doctors when they seek medical advice regarding the home remedies they take. The choice of home remedies could be because of students' perception that it is readily available at home when needed, no side effects and economic when compared to seeking medical advice.

## CONCLUSION

Menstrual disorders are very common in adolescents especially among university students due to many factors that may contribute to the irregularity of menstrual disorder. In the present study, the most common discomfort experienced by these students was pain cramps during menstruation followed by anger and loss of appetite. Other symptoms including feeling depressed and affecting their

work ability were also experienced by them. The preferred choice for the treatment of the menstrual discomfort by these students was pain killer followed by supplements and hormonal preparation. In alternative medicine, Chinese medicine was the most preferred choice of treatment. Home remedies such as raw ginger, *aloe vera* and fenugreek were also their choice of treatment among alternative medicine. About more than a quarter of percentage of the participants chose the reason for not seeking medical attention as it was not necessary. Students from health care professionals like medicine, physiotherapy, nursing, dentistry, pharmacy were in the opinion of not to seek medical advice. This might be due to their knowledge gained on health during their study, which should not be encouraged. However the treatment option in the future by engineering, dental, pharmacy and biotechnology students was dietary supplement as their first choice, whereas foundation, medicine and business students chose yoga and meditation and the rest chose home remedies. In summary, these participants failed to seek medical advice to address their menstrual problem. They have to consider this problem as their health issue. A health education program regarding menstrual problems would help these students to be concerned on their health.

## ACKNOWLEDGEMENTS

We wish to record our appreciation and sincere gratitude to all respective deans of the faculty for permitting us to conduct the study. We also record our sincere thanks and appreciation to all the participants for their valuable time, support and cooperation.

## CONFLICT OF INTEREST

The authors declare that they have no conflict of interests.

## ABBREVIATION

PMS:	Pre-menstrual syndrome
BMI:	Body mass index
SPSS:	Statistical Package for the Social Sciences

## Highlights of Paper

- The most common menstrual discomfort experienced by these students was pain cramps leading to usage of pain killers as their main choice.
- Among alternative medicines, Chinese medicine was students most preferred choice of treatment.
- Among home remedies, raw ginger was students choice.

## Author Profile

- **Mrs. Sivadasan Shalini:** Presently working as Lecture in the Faculty of Pharmacy, AIMST University, Malaysia. She has 20 nos. of journal paper; 20 nos. of abstract and she is reviewer for more than 5 journals.
- **Dr. Veerasamy Ravichandran:** Presently working as Senior Associate Professor in the Faculty of Pharmacy, AIMST University, Malaysia. He has 100 nos. of journal paper; 15 nos. of abstract and he is reviewer for more than 70 journals.
- **Mr. Abdul Nazer Ali:** Presently working as Associate Professor in the Faculty of Pharmacy, AIMST University, Malaysia. He has 10 nos. of journal paper; 15 nos.
- **Mr. Balasubramanian Ganesh Pandian:** Presently working as Lecture in the Faculty of Pharmacy, AIMST University, Malaysia. He has 5 nos. of journal paper.
- **Dr. Kasi Marimuthu:** Presently working as Senior Associate Professor in the Faculty of Applied Sciences, AIMST University, Malaysia. He has 90 nos. of journal paper; 40 nos. of abstract and he is reviewer for more than 20 journals.
- **Sundar Hemalatha, Wong Chui Ting, Maniam Yoshita:** Are final year B. Pharm (Hons) students.

## REFERENCES

- Chan SC, Yiu KW, Yuen PM, Sahota DS, Chung TKH. Menstrual problems and health-seeking behavior in Hong Kong Chinese girls. *Hong Kong Medical Journal* 2009; 15(1): 18-23.
- Howard WJ. Novak's text book of gynecology, 12<sup>th</sup> ed. Philadelphia, Williams and Wilkings; 1996.
- Esimai OA, Esan GOO. Awareness of Menstrual Abnormality Among College Students in Urban Area of Ile-Ife, Osun State, Nigeria. *Indian Journal of Community Medicine* 2010; 35(1): 63-6.
- Ziv A, Boulet JR, Slap GP. Utilization of physicians' offices by adolescents in the United States. *Pediatrics* 1999; 104(1): 35-42.
- Dangal G. Menstrual disorders in Adolescents. The internet journal of gynecology and obstetrics. 2004; 43(15): Available at <http://ispub.com/IJGO/4/1/7501>.
- Harlow SD, Campbell OMR. Menstrual dysfunction: a missed opportunity for improving reproductive health in developing countries. *Reproductive Health Matters* 2000; 8(15): 142-7.
- Walraven G, Ekpo G, Coleman R, Schref C, Morison L, Harlow SD. Menstrual disorders in rural Gambia. *Studies in Family Planning* 2002; 33(3): 261-8.
- El-Gilany AH, Badawi K, El-Fedawy S. Epidemiology of dysmenorrhoea among adolescent students in Mansoura, Egypt. *Eastern Mediterranean Health Journal* 2005; 11(1): 155-63.
- Goldrath MH. Hysteroscopic endometrial ablation. *Obstetrics and Gynecology Clinics of North America* 1995; 22(3): 559-72.
- Charu S, Amita R, Sujoy R, Thomas GA. Menstrual characteristics' and prevalence and effects of dysmenorrhea on quality of life of medical students. *International Journal of Collaborative Research on Internal Medicine and Public Health* 2012; 4(4): 276-94.
- Houston AM, Abraham A, Huang Z, D'Angelo LJ. Knowledge, attitudes, and consequences of menstrual health in urban adolescent females. *Journal of Pediatric and Adolescent Gynecology* 2006; 19(4): 271-5.
- Bitzer J, Tschudin S, Stadlmayr W. Die Menstruation und ihre Bedeutung für die Frauengesundheit. [Menstruation and its impact on women's health.]. *Zentralblatt für Gynäkologie* 2005; 127(5): 282-7.
- Vyver E, Steinegger C, Katzman DK. Eating disorders and menstrual dysfunction in adolescents. *Annals of the New York Academy of Sciences* 2008; 1135(1): 253-64.
- Fujiwara T, Nakata R. Skipping breakfast is associated with reproductive dysfunction in post-adolescent female college students. *Appetite* 2010; 55(3): 714-7.
- Chang PJ, Chen PC, Hsieh CJ, Chiu LT. Risk factors on the menstrual cycle of healthy Taiwanese college nursing students. *Australian and New Zealand Journal of Obstetrics and Gynaecology* 2009; 49(6): 689-94.
- Mesaki N, Sasaki J, Shoji M, Iwasaki H, Eda M. Menstrual characteristics in college athletes. *Nippon Sanka Fujinka Gakkai Zasshi*. 1984; 36(2): 247-54.
- Ornstein RM, Copperman NM, Jacobson MS. Effect of weight loss on menstrual function in adolescents with polycystic ovary syndrome. *Journal of Pediatric and Adolescent Gynecology* 2011; 24(3): 161-5.
- Allsworth JE, Clarke J, Peipert JF, Hebert MR, Cooper A, Boardman LA. The influence of stress on the menstrual cycle among newly incarcerated women. *Womens Health Issues* 2007; 17(4): 202-9.
- Lin HT, Lin LC, Shiao JSC. The impact of self-perceived job stress on menstrual patterns among Taiwanese nurses. *Industrial Health* 2007; 45(5): 709-14.
- Chhabra S, Venkatraman S. Menstrual dysfunction in rural young women and the presence of polycystic ovarian syndrome. *Journal of the Institute of Obstetrics and Gynaecology* 2010; 30(1): 41-5.
- Gast GC, Grobbee DE, Smit HA, Bueno-de-Mesquita HB, Samsioe GN, van der Schouw YT. Menstrual cycle characteristics and risk of coronary heart disease and type 2 diabetes. *Fertility and Sterility* 2010; 94(6): 2379-81.
- Nonato DR, Barbosa VS, Rodrigues DL, Amaral PC, Assis MR, da Silva NA. Menstrual disturbances in systemic lupus erythematosus patients using immunosuppressants. *Revista Brasileira de Reumatologia* 2010; 50(5): 501-15.
- Bauer J, Cooper-Mahkorn D. Reproductive dysfunction in women with epilepsy: menstrual cycle abnormalities, fertility, and polycystic ovary syndrome. *International Review of Neurobiology* 2008; 83: 135-55.
- Cakir M, Mungan I, Karakas T, Giriskan I, Okten A. Menstrual pattern and common menstrual disorders among university students in Turkey. *Pediatrics International* 2007; 49(6): 938-42.
- Mohite RV, Mohite VR. Correlates of the menstrual problems among rural college students of Satara district. *Al Ameen Journal of Medical Science* 2013; 6(3): 213-8.
- Karout N, Hawai SM, Altuwajiri S. Prevalence and pattern of menstrual disorders among Lebanese nursing students. *Eastern Mediterranean Health Journal* 2012; 18(4): 346-52.
- Shabnam O, Khyrunnisa B. Menstrual pattern among unmarried women from south India. *Journal of Natural Science, Biology and Medicine* 2011; 2(2): 174-9.
- Titilayo A, Agunbiade OM, Banjo O, Lawani A. Menstrual discomfort and its influence on daily academic activities and psychosocial relationship among undergraduate female students in Nigeria. *Tanzania Journal of Health Research* 2009; 11(4): 181-8.
- Shah M, Monga A, Patel S, Shah M, Bakshi H. A study of prevalence of primary dysmenorrhea in young students - A cross-sectional study. *Healthline* 2013; 4(2): 30-4.
- Amaza DS, Sambo N, Ziraheji JV, Dalori MB, Japhet H, Toyin H. Menstrual pattern among female medical students in university of Maidugui, Nigeria. *British journal of Medicine and Medical Research* 2012; 2(3): 327-37.
- Bulik CM, Algars M, Huang L, Von Holle AF, Peat CM, Thornton LM, Lichtenstein P. Binge eating and menstrual dysfunction. *Journal of Psychosomatic Research* 2014; 76(1): 19-22.
- Spears LG. A narrative review of medical, chiropractic, and alternative health practices in the treatment of primary dysmenorrhea. *Journal of chiropractic medicine* 2005; 4(2): 76-88.
- Chia CF, Lai JHY, Cheung PK, Kwong LT, Lau FPM, Leung KH, *et al.* Dysmenorrhoea among Hong Kong university students: prevalence, impact, and management. *Hong Kong Med J*. 2013; 19(3): 222-8.
- Adetokunbo1 OT, Oluwarotimi IA, Lukeman AJS, Osinusi BO. Appraisal of menstrual awareness and pattern among female secondary school students in Lagos. *Scientific Research and Essay* 2009; 4(11): 1271-4.
- Chi C, Pollard D, Tuddenham EGD, Kadir RA. Menorrhagia in Adolescents with Inherited Bleeding Disorders. *J Pediatr Adolesc Gynecol*. 2010; 23(4): 215-22.
- Zahradnika HP, Hanjalic-Beck A, Groth K. Nonsteroidal anti-inflammatory drugs and hormonal contraceptives for pain relief from dysmenorrhea. *Contraception* 2010; 81(3): 185-96.
- Agarwal A, Venkat A. Questionnaire Study on Menstrual Disorders in Adolescent Girls in Singapore. *J Pediatr Adolesc Gynecol*. 2013; 22(6): 365-71.
- Xue-mei CAI, Jie WU. The Mind-Tranquilizing and Menstruation-Regulating Method for Acupuncture Treatment of Delayed Menstrual Cycle - A Clinical Controlled Study. *Journal of Traditional Chinese Medicine* 2009; 29(1): 35-8.
- Pushpangadan PA, Rajith NP, Ambily DV, Mohan Dan V, Sree Devi P, George V. Survey on ethnomedicinal plants used for menstrual disorders in Kerala. *Indian Journal of Traditional Knowledge* 2012; 11(3): 453-60.
- Gendall KA, Bulik CM, Joyce PR, McIntosh VV, Carter FA. Menstrual cycle irregularity in bulimia nervosa Associated factors and changes with treatment. *Journal of Psychosomatic Research* 2000; 49(6): 409-15.
- Sood M, Devi A, Azlinawati, Daher AM, Razali R, Nawawi H, *et al.* Poor correlation of stress levels and menstrual patterns among medical students. *Journal of Asian Behavioural Studies* 2012; 2(7): 60-6.
- Fekr LZ, Zadeh TA, Moghadam JB, Salehian MH. Comparison of disorders menstrual frequency between female athlete and non-athlete university students. *European journal of experimental biology* 2012; 2(4): 944-7.