Prevalence of menstrual disorders in relation to BMI among medical students in university of Baghdad/ Iraq.

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Background: Menstruation or period is the monthly bleeding of a woman. This period extended between the first day of a bleeding and the first day of the next period.

During this time, the woman experiences changes in her body, especially in the uterus and ovaries of her reproductive system, due to the action of the female sex hormones (FSH, LH, estradiol and progesterone) that are preparing the body for a possible pregnancy. The amount of blood that is lost is around 35 ml, but it is normal for it to go between 10 and 80 ml. Objectives: To measure the prevalence of menstrual cycle disorders and body mass index and evaluate the relationship between body mass index and the menstrual disorders among the medical students in Baghdad university, Iraq. Methods: A cross sectional study was conducted to 202 female students of university of Baghdad collage of medicine aged (17-25 years) from all six grades. The students were selected from different grades by simple random sampling during period of October 2020 to January 2021. Data collected by questionnaire that sent to the students by internet. Results: Among 202 students aged between (17-25 years), (99%) of them were single, participated in the study, the average age of menarche was 12.73 years. The most common disorder presented was dysmenorrhea in 186 students (92.1%) divided to mild (40.1%), severe (43.1%) and very severe (13.4%). 42 students (20.8%) had irregular cycle, while 160 students (79.2%) had regular cycle. 11 students (5.4%) had menorrhagia and 6 students (3%) had light menstrual cycle. The total number of students with normal BMI was 140 (69.3%), 16 students fall underweight constituting (7.9%), overweight were 44 students (21.8%) and obese were 2 students (1%). We found no significant association between BMI and menstrual cycle disorders (p>0.05). Conclusion: This study showed that the most common disorder among medical students is dysmenorrhea and most of the females participating in this study have normal body mass index and there is no significant
association between BMI and menstrual disorders which can be explained by the small sample size and relatively the normal relatively the normal body mass among the majority of participants.

**Key words:** Menstrual cycle, Menstrual disorders, Dysmenorrhea, BMI.

**Introduction :**

Menstruation or period is the monthly bleeding of a woman and this period extended between the first day of a bleeding and the first day of the next period. Menstruation is a cyclical loss of vaginal blood, lasting from 2 to 7 days. This blood loss results from the shedding of the “lining” of the uterus (endometrial) with each menstrual cycle. Menstruation occurs once a month, approximately 28 days from one date to another, but it can reach up to 40 days, being considered normal.

During this time, the woman experiences change in her body, especially in the uterus and ovaries of her reproductive system, due to the action of the female sex hormones (FSH, LH, estradiol and progesterone) that are preparing the body for a possible pregnancy. The amount of blood that is lost is around 35 ml, but it is normal for it to go between 10 and 80 ml.\(^{(1,2)}\)

Regular menstrual periods during the years between puberty and menopause are often a sign that your body is functioning normally. Irregular, heavy, or painful periods are not normal. Many women can also experience the symptoms of premenstrual syndrome (PMS).\(^{(2,3)}\) Menstrual cycle is a determinant of female’s health. Disorders in cycle or its irregularities are a major gynecological problem among female adults, especially young female and a major source of anxiety to them and their family.\(^{(4)}\) Apart from the physiological variation, many other factors have been found to cause menstrual disorder. These include environmental, nutritional, drugs, physical activities and stress.\(^{(2)}\) The spectrum of menstrual irregularities ranges from disorder of cycle length to disorder of flow.\(^{(5)}\)

**Causes of MC disorders:**

A) Pathological causes;

1) Structural abnormalities of uterus include; polyps, adenomyosis, leiomyomas (fibroids), and malignancies. And rare problems such as imperforate hymen or transverse vaginal septum.

2) Functional disorders include; coagulation defects, ovarian dysfunction (formerly DUB), endometrial causes, and iatrogenic.

3) Idiopathic causes.

B) Physiological causes:

1) Menstrual irregularities can be associated with normal conditions, such as puberty or ovulation.
2) Pregnancy and breastfeeding.
3) Lifestyle conditions:
4) Medications: such as birth control pills. (3, 6, 7)

Weight loss or gain can impact the production of hormones which cause ovulation, specifically estrogen, and hypothalamic functioning, potentially changing the regularity and length of menstrual periods. Overweight or obese females. The (BMI is 25 kg/m2 to 35 kg/m2) carrying extra fat cells (basic cholesterol compounds in fat cells can get changed to estrone, which have an estrogenic effect on glands). So, this added estrogen (that derived from estrone) can cause delay amenorrhea or have abnormal uterine bleeding.

Underweight females do not have much fat or excessive exercise or illness are behind low BMI so they have fewer periods or go longer without ovulating. (3,8,9)

Methodology:

This is a cross-sectional study was conducted to 202 female students of university of Baghdad collage of medicine aged (17-25 years) from all six grades. The students were selected from different grades by simple random sampling during period of October 2020 to January 2021. The inclusion criteria, included all female medical students who were chosen by simple random sample and agree to participate in this study. The exclusion criteria, included all females who married and on contraceptive methods, females who take medication for thyroid disease, and females who have hyperthyroidism or hypothyroidism.

A verbal informed consent was obtained from the students before fill the questionnaire. Data collected by questionnaire that send to the students, including name, age, marital status, weight, height, age of menarche, duration, frequency (interval), regularity variation, blood loss, pain and its severity, physical activity, fluctuation in mood, appetite, other symptoms, past medical history, family history of similar illness, surgical history, drug history, obstetric history, gynecological history.

The menstrual interval/frequency was considered regular, if it is within the range of 24 - 38 days, and irregular if less than 24 days or more than 38 days. While the duration of period was categorized into shortened (less than 4.5 days), normal (4.5 - 8 days), prolonged (more than 8 days). The regularity variation was categorized into regular (i.e variation +/- 2-20 day), irregular (i.e variation > 20 day). The amount of blood loss was categorized light (less than 5 ml), normal (5 - 80 ml), heavy (more than 80 ml). (3)

Statistical Analysis

The data analysis was done by using IBM SPSS (Statistical Product and Service Solutions) program version 22. Continuous data were presented in the form of mean and standard deviation while categorical was presented as number and percent. The categorical collected data were statistically analyzed using Chi-square and Fisher’s exact test when needed. Analysis is performed
using the menstrual duration, frequency, regularity variation, amount of blood loss, and pain among underweight, normal, overweight and obese students.

**Results:**

Among 202 students aged between (17-25 years), (99%) of them were single, participated in the study, the average age of menarche was 12.73 years. The most common disorder presented was dysmenorrhea in 186 students (92.1%) divided to mild (40.1%), severe (43.1%) and very severe (13.4%). 42 students (20.8%) had irregular cycle, while 160 students (79.2%) had regular cycle. 11 students (5.4%) had menorrhagia and 6 students (3%) had light menstrual cycle. Normal duration of the period (4.5-8 days) was reported by 153 students (75.7%), 42 students (20.8%) had a period shorter than 4.5 days and 7 students (3.5%) had duration for more than 8 days. Regarding to the interval between the periods, 168 students (83.2%) had normal interval (24-38 days), 16 students (7.9%) had an interval less than 24 days, 17 students (8.4%) their interval was more than 38 days, and amenorrhea was reported by one student (0.5%). In our study, the total number of students with premenstrual syndrome symptoms was 79 (39.1%).

Table(1) : Descriptive statistics of age and age of menarche.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>202</td>
<td>17</td>
<td>25</td>
<td>21.00</td>
<td>1.809</td>
</tr>
<tr>
<td>Age of menarche</td>
<td>202</td>
<td>11</td>
<td>15</td>
<td>12.73</td>
<td>1.315</td>
</tr>
</tbody>
</table>

The total number of students with normal BMI was 140 (69.3%), 16 students fall underweight constituting (7.9%), overweight were 44 students (21.8%) and obese were 2 students (1%). We found that among the normal weight students 29 one (20.7%) had irregular cycle, 111 students (79%) had regular cycle, 6 students (4.3%) had menorrhagia, 3 students (2.1%) had light menstrual cycle, 131 students (93.6%) had dysmenorrhea, 29 students (20.7%) had shortened period, 107 students (76.4%) had normal duration of period and 4 students (2.9%) had prolonged period. Regarding the frequency of the cycle 115 students (82.1%) of normal weighted students had normal period interval (24-38 days), 9 students (6.4%) had interval less than 24 days, 15 students (10.7%) more than 38 days and one student (0.7%) had secondary amenorrhea.

Among overweight students, 34 students (77.3%) had regular cycle, 10 students (22.7%) had irregular cycle, 2 students (4.5%) had menorrhagia, 3 students (6.8%) had light menstrual cycle,
39 students (88.6%) had dysmenorrhea, 40 students (90.9%) had normal period interval, 3 students (6.8%) had interval less than 24 days, one student (2.3%) had interval more than 38 days. 10 students (22.7%) had shortened period, 32 students (72.7%) had normal duration and 2 students (4.5%) had prolonged period. There was no primary or secondary amenorrhea (0%).

In class I obesity, 2 students (100%) had regular cycle, while there was no obese student in our sample who reported an irregular cycle (0%), menorrhagia (0%) or light menstrual cycle (0%). Both the obese students had dysmenorrhea (100%), normal intervals between the periods (100%) and normal period duration (100%). There was no primary or secondary amenorrhea (0%).

In underweight, 13 students (81.3%) had regular period, 3 students (18.8%) had irregular period, 3 students (18.8%) had menorrhagia, no student (0%) had light menstrual cycle, 14 students (87.5%) had dysmenorrhea. 11 students (68.8%) had normal period interval, 4 students (25%) had period interval of less than 24 days and one student (6.3%) had period interval more than 38 days. 12 students (75%) had normal duration of period, 3 students (18.8%) had shortened period and one student (6.3%) had prolonged period. There was no primary or secondary amenorrhea.

Figure (1): The association between menstrual regularity and BMI.
By using chi square test and fisher exact test to evaluate the association between menstrual irregularities and BMI we found that there was no significant association between menstrual regularity and BMI (P= 0.97, P> 0.05), no significant association between dysmenorrhea and BMI (P=0.35, P > 0.05), no significant association between the amount of blood loss and BMI (P=0.15, P> 0.05), no significant association between the frequency of the cycle and BMI (P=0.2, P>0.05) and no significant association between the duration of the period and BMI (P=0.86, P>0.05).

Table (2): The numbers and percentages of the history list of the medical students

<table>
<thead>
<tr>
<th>Characters</th>
<th>Number of subjects</th>
<th>Percentages(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical activity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active with regular exercise</td>
<td>28</td>
<td>13.9</td>
</tr>
<tr>
<td>Doing some exercise</td>
<td>113</td>
<td>55.9</td>
</tr>
<tr>
<td>Sedentary</td>
<td>61</td>
<td>30.2</td>
</tr>
<tr>
<td><strong>Medical history</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Students who were performing regular physical exercise, suffered less from menstrual abnormalities in relation to the severity of the pain, prolonged or shortened duration, and PMS in comparison to students with sedentary lifestyle and those without scheduled exercise.

Table (3): Prevalence of pain severity in relation to
Table (4): Prevalence of duration of period in relation to physical activity

<table>
<thead>
<tr>
<th>Physical activity</th>
<th>Duration of period</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>shortened (less than 4.5 days)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>normal (4.5-8 days)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>prolonged (more than 8 days)</td>
<td></td>
</tr>
<tr>
<td>active with regular exercise</td>
<td>Count: 8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>% within Duration of period: 19.0%</td>
<td></td>
</tr>
<tr>
<td>doing some exercise</td>
<td>Count: 22</td>
<td></td>
</tr>
<tr>
<td></td>
<td>% within Duration of period: 52.4%</td>
<td></td>
</tr>
<tr>
<td>sedentary</td>
<td>Count: 12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>% within Duration of period: 28.6%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Count: 42</td>
<td></td>
</tr>
<tr>
<td></td>
<td>% within Duration of period: 100.0%</td>
<td></td>
</tr>
</tbody>
</table>

Discussion:

In our study, the mean age of menarche is 12.73 years, whereas Studies conducted in India by Prasad B G et al, and Omidvar S et al, had observed an average age of menarche to be 12.4, 13.4, 13.5, and 13.6 years, which are similar to this study. (10-13)

Slight variations in the age of menarche may occur depending on their hereditary pattern and nutritional status. (14) Another study among Lebanese nursing students conducted by Karout N, et al, reported that, delayed menarche below the minimal normal range, was present in girls with poor nutrition and earlier in girls with high-energy intake. (15)

In our study, the most common disorder is dysmenorrhea, which affects (92.1%) of the menstruating students, and (13.4%) of students experienced very severe pain that made them seek medical consultation. Many studies like that conducted by Hirata M et al, and Chauhan M et al, found a significant association between BMI and dysmenorrhea, (16-18) but our results agree with a
study conducted in Saudi Arabia by Al Amir, R.A as the relation between body mass index and dysmenorrheal was not reach the significant value. (19)

In the present study, (79.2%) had regular cycle whereas (20.8%) had irregular cycle. Meanwhile, the study conducted by Begum, J., et al, found that majorities (87.4%) of the female students with regular cycles, whereas the rest (12.7%) were presented with irregular cycles. (20) The differences between both studies may be attributed to environmental, nutritional, lifestyle and racial factors. Regarding to the association, we found that there was no significant association between BMI and menstrual regularity, and that was similar to studies as that done by Labib Al-K, M. M., et al, and Sen, et al. (16, 21)

Regarding the premenstrual syndrome, Three or more symptoms of PMS (breast tenderness, abdominal bloating or swelling, rapid mood changes depressed mood, acne...etc) were reported by (39.1%) of the students, which is lower than the results of a study that was conducted in India by Chhabra S, et al, who studied menstrual dysfunction in rural young women and reported the prevalence of PMS as 67%. (22)

In the current study, (7.9%) students had an interval less than 24 days, and (8.4%) their interval was more than 38 days, while in a study conducted by Honnakamble, R., et al, and Rajoura, O., et al, , who found that, the prevalence of the period intervals less than 21 days was (5.2%), and 40 student (19.1%) had cycles after every 38 days. (23)

Shortened period with a duration of flow of less than (4.5 days) days was prevalent in (20.8%) of students, and we found it to be more in normal weighted students and overweight students than to another study done by Dutta, B, et al, which reveals the shortened period prevalence as (3.5%) in adolescents, and it was more in underweight and obese girls. (24) In our present study we did not find any significant association in both the frequency of menstrual cycles and the duration among groups according to BMI categories, although previous studies such as Hartz AJ, et al, Harlow SD et al, Higham JM, et al, and Gao Y, et al, had found the association between them. (16, 25-28) We found that, (5.4%) of the students had menorrhagia, and this is in agreement with that found by a previous studies carried by Kadir RA, et al, Carlson KJ, et al and Palep-Singh M, et al, showed that menstrual amount of blood loss affects women’s quality of life and that heavy bleeding can put women at risk of anemia. (29-31)
Our study shows no statistical significance regarding menorrhagia, which was similar to the result of a study done by Aladashvili-Chikvaidzeetal N et al, who reported non-significant correlation. (32) According to our study, the relation between BMI and other menstrual problems (light menstrual cycle and amenorrhea) was not significant, and that’s results was similar to a study conducted by Mandana Z. in Sari, Iran. (33) While a study done by Shahbazian N, et al, confirmed this relation. (34)

Conclusion:

This study showed that the most common disorder among medical students is dysmenorrhea and most of the females participating in this study have normal body mass index and there is no significant association between BMI and menstrual disorders which can be explained by the small sample size and relatively the normal body mass among the majority of participants.

limitations of the study: Firstly, it was difficult for the researchers to measure height and weight by themselves because of Corona virus pandemic (COVID-19). Secondly, recall bias was noted about menstrual characteristics as the students 'self-report. Thirdly, 68 students did not accept to fill the questionnaire so the sample size was less than expected.

No conflicts of interest

Source of funding: self

Ethical clearance: was taken from the scientific committee of the Iraqi Ministry of health

References:

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