Relationship between Body Mass Index and Menstrual pattern among Female Nursing Students

Eman Salah Mohamed [1], Elsaida Gouda Nasr [2] Samar Elrefaey Abaza [3], Asmaa Mohamed Ahmed [4]

[1]Demonstrator in Maternal and Neonatal Health Nursing- Faculty of Nursing Al-Fayoum University, Egypt.

[2]Assistant Professor of Maternal and Neonatal Health Nursing, Faculty of Nursing, Fayoum University, Egypt.

[3, 4]Lecturer at Maternal and Neonatal Health Nursing- Faculty of Nursing Fayoum University, Egypt.

Corresponding author: Eman Salah Mohamed
Email: esm11@fayoum.edu.eg

Abstract

Background: Adolescence is a stage of maturation and a time of social, psychological, emotional, and physical transformation. Menstruation, is a physical expression of the intricate endocrine system and the ultimate indication of femininity. Being overweight, obese, or underweight can result in irregular ovulation. **Aim:** To evaluate the relationship between BMI and menstrual pattern among female nursing students at El Fayoum University. **Design:** A Comparative Descriptive Study design was used. **Setting:** The study was carried out at Faculty of Nursing El Fayoum University, Egypt. **Sample:** Two Groups of nursing students (n=200) (100 obese students and 100 non-obese students). **Tools**: Four tools were used for data collection. **Tool I:** A Structured interviewing questionnaire: Included (A) Socio demographic data. (B) Food habits of female students. (C) Menstrual assessment **Tool II:** Premenstrual symptoms assessment. **Tool III:** Assessment of intensity of menstrual pain. **Tool (IV):** BMI Assessment Sheet. **Results:** The findings of present study revealed that there was highly statistically significant negative correlation between BMI and pain intensity during menstrual cycle among the studied none obese female nursing students. While, there was highly statistically significant positive correlation between BMI and pain intensity during menstrual cycle among the studied obese female nursing students. **Conclusion:** According to the study's findings, high and low BMI have a negative effect on the menstrual cycle. Lifestyle changes and dietary guidance could help with menstrual issues. **Recommendation:** The study suggests implementing an educational program for adolescent's females to promote their awareness about the role that lifestyle and dietary factors have in reducing the symptoms of menstrual distress.

Keywords: Menstrual pattern– Body mass index -Adolescent female students.

Introduction:

The menstrual cycle is a physiological alteration that occurs during woman's reproductive age. It involves modifications to the structure, function of the endometrium and reproductive hormones production. It is calculated starting on the first day of one menstruation and ending on the first day of the next. Normal cycle lasts between 21 to 35 days on average and in teenagers, it can last up to 45 days **(Desmawati, D., Berliani, H., & Utama, B. I. 2024).** Adolescence is the developmental stage that lasts from puberty until early adulthood. Its quick growth is one of its defining characteristics. There is a tight relationship between nutrition and the teenage transition because eating habits and behaviors are influenced by a variety of factors, such as body image, mass media, social pressure, parental modeling, food availability, food preferences, cost, and convenience. **(Daly., O'Sullivan & Kearney 2022).**

Every woman's menstruation is a significant event in her life since it signifies the passage from girlhood to womanhood. It is a normal and necessary aspect of the reproductive cycle and represents the capacity for conception and childbearing as well as the possibility of fertility. A woman's general health and well-being are also thought to be significantly influenced by it. Menstrual health and well-being maintenance is also complicated and impacted by a number of psychological, physiological, social, and economic issues. Menstrual flow ranges from 30 to 80 milliliters per cycle, with the first three cycles seeing the most bleeding. Any departure from the typical features of the menstrual cycle could be a sign of hormone imbalances or other menstrual cycle-affecting factors **(De Silva & Tyson, 2024).**

The regularity of the menstrual cycle is influenced by a number of factors, including body mass index (BMI), physical activity, nutritional condition, daily sleeping hours, exposure to smoking, and psychological issues. College students lead extremely stressful lives, and because of their poor eating habits and sedentary lifestyles, they are more prone to several menstruation irregularities **(Verma et al., 2020)**.

Excessive fat accumulation brought on by a long-term imbalance between energy intake and expenditure is known as obesity. It negatively impacts the human body, especially the health of the reproductive system. Obese women in particular frequently experience menstrual disorders and are disrupted by the pituitary-ovarian-hypothalamic axis. Women with high body fat will have an impact on the estrogen hormone production, in addition to the ovaries,

adipose tissue also produces estrogen, which causes it to be abnormally high. The menstrual cycle may be disturbed as a result of this imbalanced hormones production. **(Czlapka-Matyasik et al., 2025).**

A popular anthropometric tool for estimating an individual's underweight or overweight status in adults and adolescents is the body mass index (BMI). It shows the individual's current state of health. The WHO states that a BMI of less than 18.5 indicates underweight, between 18.5 and 24.9 indicates normal weight, between 25.0 and 29.9 indicates overweight, and greater than 30.0 indicates obesity **(Sarita& Jitendra K, 2019).**

The menstrual cycle is associated with body mass index (BMI). This is because a woman's menstrual cycle can be influenced by her BMI through the hormone estrogen. The ovaries, placenta, adrenal glands, and adipose tissue all produce estrogen. It is well known that eating too many calories and gaining a lot of weight can raise blood estrogen levels. It has increased androgens in addition to a significant increase in body fat. It is well known that granulosa cells and adipose tissue will aromatize androgens into estrogen. Negative feedback on GnRH secretion will be triggered by elevated blood estrogen levels **(Desmawati et al., 2024).** Menstrual irregularities are a prevalent problem that affects women all over the world. They impact 75% of teenage girls and are becoming more and more important causes of gynecological visits. Approximately 87% of female students in Egypt experience irregular periods. Frequently, menstruation irregularities affect university students' everyday lives. But this problem frequently gets little attention, especially in underdeveloped nations. **(Nicola Ghatas et al, 2024).**

Among these irregularities include premenstrual syndrome (PMS), dysmenorrhea, menorrhagia, hypo-menorrhea, polymenorrhea, oligomenorrhea, amenorrhea, and other substantial alterations in the interval, duration, or amount of menstrual flow in comparison to the normal menstrual cycle **(Attia et al., 2023).**

Accordingly, dietary practices can induce on a number of menstrual abnormalities and considered one of the potential influences on women’s general health. A healthy diet, which includes eating breakfast every day and avoiding junk food, is associated with better menstrual health. However, poor eating habits, such as consuming fast food, may raise the chance of menstruation problems **(Taheri et al., 2020).**

Centered around communities Health, nurse's involvement in encouraging teenagers to have healthy lives is vital. A nurse should therefore understand the

significance of health-promoting practices including stress reduction, physical exercise, good sleep hygiene, eating a balanced diet, and preserving positive relationships. The community's health will be influenced by nursing schools, however, as they can offer a suitable environment for teaching teenagers healthy behaviors. Vital signs checks are also frequently performed by nurses as part of a standard physical examination. As part of the Review of Systems, the American College of Obstetricians and Gynecologists (ACOG) published a committee opinion item recommending that the length of the menstrual cycle and the menstrual pattern be evaluated **(Abdel-Baset Taha et al., 2023).**

Significance of the study:

Adolescence is viewed in Egypt as a neglected time. However, it is a crucial transitional stage between childhood and adulthood, during which one grows, changes, and acquires the ability to procreate **(Bahari et al., 2021).** A 2019 survey called "100 million health" found that 39.8% of Egyptian adults (defined as those with a BMI of 30 kg/m2) were obese, screening 49.7 million adults aged 18 and over. Adult females in Egypt were more likely than adult males to be obese (49.5%) compared to 29.5% of adult males **(Aboulghate et al., 2021).** Menstrual abnormalities are the primary cause of gynecological appointments, affecting 75% of teenage girls. Menstrual cycles are impacted by a number of hormonal changes that many undergraduate students experience as adolescents **(Odongo et al., 2023).** Understanding how obesity, or BMI, affects a woman's menstrual cycle is crucial for nursing students. However, there are a few nursing research in Egypt that attempt to evaluate how BMI affects menstruation issues. Therefore, the proposed study will aid in evaluating the connection between menstruation pattern and BMI.

Aim of study:

This study aimed to evaluate the relationship between BMI and menstrual pattern among female nursing students at El Fayoum University. **This aim will be achieved through:**

1- Estimating BMI among female nursing students.
2- Assessing menstrual pattern of female nursing students.
3- Evaluating the effect of BMI (Overweight) on menstrual pattern in female nursing students.
4-Assessing prevalence of obesity among females university students at faculty of nursing.

Research questions:

1-What is the prevalence of obesity among female nursing students?

2- What is the impact of obesity on menstrual pattern among female nursing students?

Subjects and Methods:

Research design:

A Comparative descriptive study design was adopted to accomplish the aim of this study.

Setting:

The study was conducted at the faculty of Nursing – El Fayoum university, Egypt.

Type of Sample: A purposive sample selected by body mass index was used in this study.

Sample size:

A total of 200 nursing students with the studied criteria were selected. The total sample divided into two equal groups; 100 obese female students and 100 non obese female students.

Inclusion criteria:

Female nursing Students at age of adolescence.

Exclusion criteria:

Female nursing students who were married.

Being on treatment for menstrual problem.

Have primary amenorrhoea.

Have undergo pelvic surgery.

Have any chronic disease.

Refuse participation in the study.

Female nursing students their age more than 20 years.

Tools of Data Collection:

Four tools were used for data collection in the present which developed by the researcher and revised by the experts to confirm its validity:

Tool I: Structured Interviewing Questionnaire:

It developed based on the review of currently related literature and used by the researcher to collect the data needed on the subjects of the study It comprised of three parts:

a. **Part 1:** Socio-demographic characteristics of female nursing students: It was used to assess; age, residence, grade of education, work beside study, mother educational level, and family income level.

b. **Part 2:** Food habits of female nursing students: It was used to assess; regularity of meal times, eating breakfast daily, having fast food, entertainment and soft drinks, the way of cooking food, following a specific diet.

c. **Part 3:** Menstrual history of female nursing students: It was used to assess age of menarche, regularity of the cycle, duration of menstruation, amount of menstrual bleeding, interval of cycle and the form and color of menstrual blood, any interruption occur in menstrual cycle and its period and knowledge of the adolescent girl regarding general reasons that lead to irregular menstrual cycle.Time and site of dysmenorrheal pain.

Tool II: Severity of premenstrual symptoms assessment:

This tool was adapted from **(Elnagar & Awed, 2015),** modified by the researcher

and consisted of 26 items and included three major symptoms:

Part I: Physical symptoms included 16 items.

Part II: Psychological symptoms included 6 items.

Part III: Behavioral symptoms included 4 items.

Scoring system for PMS severity:

Each item was scored on a 4-point Likert scale (0 = None, 1 = Mild, 2 = Moderate, 3 = Severe).

Degree of PMS

Mild Up to 47 points

Moderate 48- 72 points

Severe More than 73-96 points

Tool (III): Menstrual pain intensity assessment: By using Visual analog scale. This tool adopted from **(Abou-Dakin, 2012).** It used to examine the degree of pain occur during menstrual period and included ten points, each point is scored on a scale of 0 indicate (no pain), from 1: 3 (mild pain), 4:6 (moderate pain) and from 7:10 indicate (severe pain)

Tool (IV): BMI assessment sheet:

The BMI is Weight in kilograms divided by Height in meters squared (Weight (Kg)/Height (m)2).

-lower than 18.5 is considered as underweight

-Between 18.5 to 24.9 as normal weight

-25.0 to 29.9 as overweight

-Higher than 30.0 as obese.

Tools Validity:

The validity of the tools was ascertained by professors of subject area and three experts (juries) in the field of obstetric nursing, who reviewed each tool for content and internal validity. Also, they were asked to judge on items for relevance, completeness and clarity. Modification was done based on the comments.

Tools Reliability:

Regarding to the reliability, the researcher used Cronbach's Alpha test to tent the internal reliability.

Pilot Study:

A pilot study was conducted on a sample of 10% of the cases, which equal (20) girl's students from the studied sample (10 obese girls and 10 non obese girls) to evaluate clarity of the data collection tools. The sample of Pilot study was excluded from the studied sample. There were modifications in the time of all tools to save participants time.

Ethical approval:

An official permission to conduct the proposed study was obtained from the Scientific Research Ethics Committee of the Faculty of Nursing, El-Fayoum University. (20- 8- 2023). The study involved female nursing students who were informed about its purpose and objectives, obtained written consent, and had the option to withdraw at any point. Confidentiality was maintained throughout; ensuring female nursing students rights were protected.

Field of work:

-Data collection took place over three months, starting in early October 2023 and concluding at the end of December 2023. The researcher was attended to the faculty of nursing Fayoum university two days / week (Sunday and Thursday from 12pm: 2 pm) for the previous mentioned setting, attendance was, according to time table prepared by researcher to match what's suitable for student girls of the studied sample, all studied samples were selected according to inclusion criteria until the predetermined number of the studied sample is obtained.

-Data collection was carried out through: Interviewing and assessment meetings.

Interviewing and Assessment.

-In this meetings the researcher met adolescent girls' students and the purpose and nature of the study were explained and socio demographic and data of menstrual cycle among female nursing students (tool number I, II) were filled after taking the informed consent of the nursing students to participate in the study.

-After distributing the tools to studied sample at the suitable setting for girls' students (classes of the faculty), they were informed of how the questionnaires were to be filled in. The data collected was self-reported by the students.

-Then the researcher filled part (3) of questionnaire that includes (Weight, Height, BMI and Classification of student according to BMI).

Statistical design:

The data which were obtained reviewed, prepared for computer entry, coded, analyzed and tabulated for some important results. The statistical package for social science (IBM SPSS – version (20). Appropriate statistical technique and testes of significance were used. In analysis and data collection.

-The chi - square test was used to compare quantitative items between groups.

-T-test was used to compare qualitative variable.

Degrees of significance of results were considered as follows:

- P-value > 0.05 Not significant (NS)
- P-value ≤ 0.05 Significant (S)
- P-value ≤ 0.01 Highly Significant (HS).

Administrative design:

Necessary official approval to conduct the study was obtained from the Dean of Faculty of Nursing - El Fayoum University for explanation of the nature and purpose of the study for the female nursing student before obtaining their written consent. All data were collected by the research.

Results:

Table (1): Shows **s**ocio demographic characteristics of students and illustrated that the mean age of the non-obese group was 19.16±0.58 years, while mean age in

the obese group was 19.07±0.60 years. (69.0% and 66.0%) of the obese and non-obese groups reside in rural areas, respectively. Also, (68.0% and 59.0%) of the obese and non-obese groups, respectively have insufficient income. there were no statistically significant differences between the two groups regarding all their socio demographic characteristic at ($p > 0.05$) and test results not valid.

Table (2): Shows the menstrual pattern of the student girls, illustrated that nearly two thirds of the obese group (65.0%) and more than three quarters of the non-obese students (76.0%) experienced menarche at the age range from 10 -16 years old. nearly half of the obese students (46.0%) reported having irregular menstrual cycle. While, the majority of the non-obese group (84.0%) have regular menstrual cycle, more than one quarter of the obese students (26.0%) have cycle length >35 days while about half of the non- obese students (52.0%) have cycle length 25-30 days, more than half of the obese students (56.0%) and about four fifth of the non-obese students (80.0%) reported have a duration of menstrual period between 3-7 days. However, about two fifth of the obese group (40.0%) reported more than 7days as a duration of menstrual period, more than two fifth of the obese group (48.0%) reported a heavy amount of menstrual blood while more than half of the non-obese students (58.0%) reported moderate amount of menstrual blood and all the subjects of both groups (100.0%) reported suffering from abdominal and back pain during the menstrual period.

Table (3) and figure (1): Shows the severity of PMS of the studied students and illustrated that, more than half (52.0%) of the obese group have experienced moderate PMS. While, the majority of the non-obese group had reported mild PMS and showed highly statistically significant differences between the non-obese and obese groups ($X^{2=}47.09$, $p < 0.01$).

Figure (1): This figure reveals that, about three fifth of the obese group (60.0%) reported suffering from severe pain during their menstrual period while about half of the non-obese group (54.0%) reported suffering from moderate pain during menstrual period. However, (10.0%) of the obese students reported suffering from very severe pain during their menstrual period and (18.0%) of the non-obese group reported experience severe pain during their menstrual period**.**

Figure (3): Shows that about two fifth of the female university students at faculty of nursing have moderate pain during menstrual cycle. Also, near to two fifth of them have severe pain. While, less than one fifth of them have mild pain. Although about 5% of them experience very severe pain.

Figure (4): Displays that, more than half of the obese groups (58.0%) were overweight and (34.0%) were obese while about four fifth of the non-obese group have normal weight (80.0%) and (20.0%) were underweight.

Figure (5): Illustrates that about two fifth 40% of the female university students at faculty of nursing have normal weight and 10% were under weight. While, more than one fifth (29%) of them were overweight. Also, near to one fifth 17% of them were obese and 4% were extremely obese.

Table (4) Shows that, there was highly statistically significant relation between pain intensity during menstrual cycle among the studied obese female nursing students and their eating habits as eating meals on time regularly every day, eating daily breakfast before going to university, eating fast food, eating entertainment during the day, drinking soft drinks between meals, method of cooking food in home and following a specific diet at (P= < 0.01).

Table (5): Illustrates that, there was highly statistically significant relation between pain intensity during menstrual cycle among the studied obese female nursing students and their menstrual cycle regularity, menstrual cycle (days), duration of menstrual blood flow (days), amount of menstruation, sleeping during period, eating certain foods during period and history from interruption in menstrual period at (P= < 0.01). Also, there was statistically significant relation with age of menarche, the form of menstrual bleeding, feeling during period at (P= < 0.05).

Table (6): Indicates that, there was highly statistically significant negative correlation between body mass index and pain intensity during menstrual cycle among the studied none obese female nursing students at (P= < 0.01). While, there was highly statistically significant positive correlation between body mass index and pain intensity during menstrual cycle among the studied obese female nursing students at (P= < 0.01).

Table (1): Socio demographic characteristics of the female nursing students in obese and non-obese groups

Socio demographic characteristics	Non obese group (n=100)		Obese group (n=100)		X^2	P-Value
	No.	%	No.	%		
Age					1.341	0.511
18 years	10	10.0	15	15.0		
19 years	64	64.0	63	63.0		
20 years	26	26.0	22	22.0		
Mean ± S.D	19.16±0.58		19.07±0.60		t=1.071	0.286
Grade					1.299	0.254
First	60	60.0	52	52.0		
Second	40	40.0	48	48.0		
Place of residence					0.205	0.651
Rural area	66	66.0	69	69.0		
Urban area	34	34.0	31	31.0		
Mother's education level					2.510	0.474
Illiterate	4	4.0	9	9.0		
Basic education	10	10.0	12	12.0		
Secondary education	64	64.0	57	57.0		
High education	22	22.0	22	22.0		
Working besides studying					0.101	0.750
Yes	26	26.0	28	28.0		
No	74	74.0	72	72.0		
Family Income Level					1.747	0.186
Sufficient	41	41.0	32	32.0		
Insufficient	59	59.0	68	68.0		

Table (2): Menstrual cycle data of the female nursing students. (n= 200)

Menstrual cycle data	Non obese group (n=100)		Obese group (n=100)		x^2	p-value
	no.	%	no.	%		
Age of menarche (years)					6.887	0.032*
<10 years	6	6.0	18	18.0		
10-16 years	76	76.0	65	65.0		
> 16 years	18	18.0	17	17.0		
Menstrual cycle regularity					21.03	0.000**
Yes	84	84.0	54	54.0		
No	16	16.0	46	46.0		
Menstrual cycle (days)					15.16	0.004**
<2l	8	8.0	12	12.0		
21<25	22	22.0	21	21.0		
25<30	52	52.0	32	32.0		
30<35	10	10.0	9	9.0		
>35	8	8.0	26	26.0		
Duration of menstrual blood flow (days)					14.52	0.001**
<3	4	4.0	4	4.0		
3-7	80	80.0	56	56.0		
>7	16	16.0	40	40.0		
Number of sanitary pads do you use during period					25.16	0.000**
<8 pads	23	23.0	23	23.0		
8-10 pads	51	51.0	20	20.0		
11-12 pads	18	18.0	38	38.0		
>12 pads	8	8.0	**19**	**19.0**		
Amount of menstruation					37.19	0.000**
Scanty	7	7.0000	0	0.0		
Small	24	24.0	13	13.0		
Moderate	58	58.0	39	39.0		
Soaked/ heavy	11	11.0	48	48.0		
The bleeding of the menstrual period is in a form					44,44	0.000**
Liquid	90	90.0	20	20.0		
Coagulated	10	١0.0	78	78,0		
Large blood clots	0	0.0	2	2.0		
The color of menstrual blood					4.082	0.121
Dark red	100	100.0	96	96.0		
Light red	0	0.0	4	4.0		
***Complain of any of troubles during period**					26.41	0.003**
Pain in the abdomen and back	100	100.0	100	100.0		
Tendency to vomit	26	26.0	27	27.0		
Feeling cold	36	36.0	44	44.0		
Feeling tired and exhausted	82	82.0	87	87.0		

Table (3): Distribution of the studied female nursing students according to their premenstrual symptoms' severity. (n=200).

Levels of premenstrual symptoms' severity	Non obese group (n=100)		Obese group (n=100)		x^2	P-value
	No.	%	No.	%		
Mild	91	91.0	46	46.0	**47.09**	**0.000****
Moderate	9	9.0	52	52.0		
Severe	0	0.0	2	2.0		

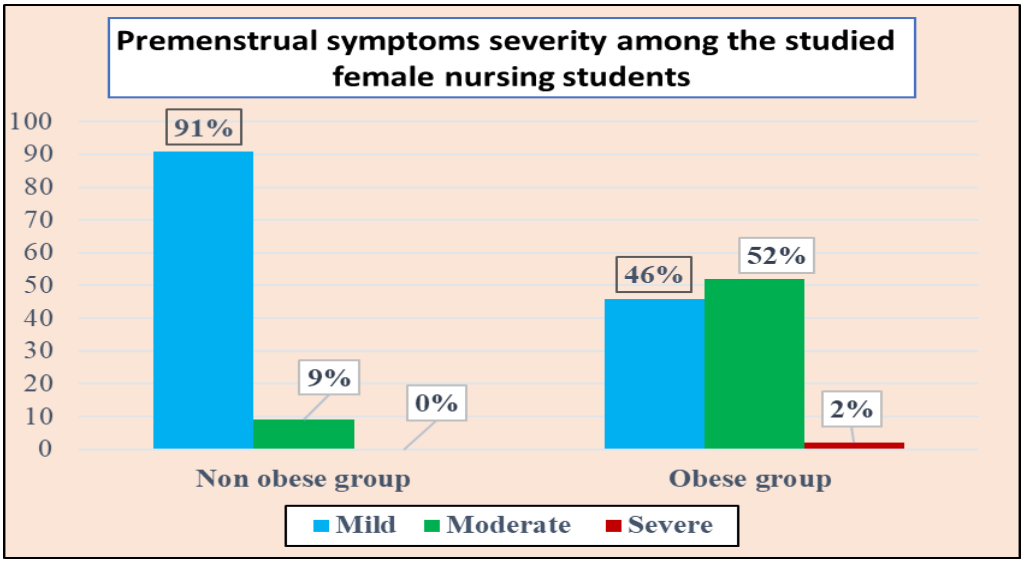

Figure (1): Percentage distribution of the studied female nursing students according to premenstrual symptoms' severity (n=200).

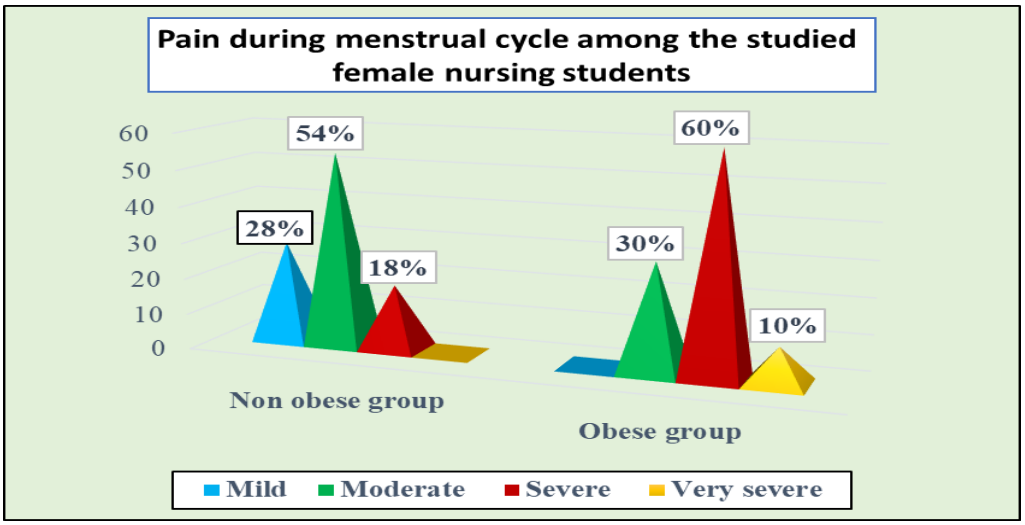

Figure (2): Percentage distribution of the studied female nursing students according to pain intensity during menstrual cycle (n=200) (100 obese students and 100 non-obese students)

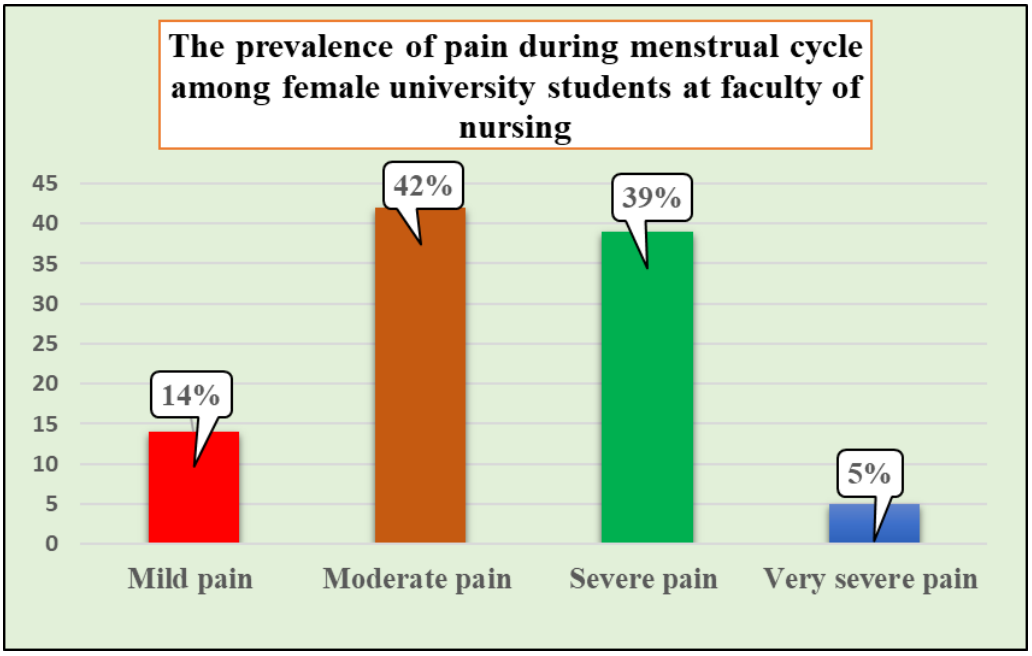

Figure (3): The prevalence of pain intensity during menstrual cycle among female university students at faculty of nursing (n=200).

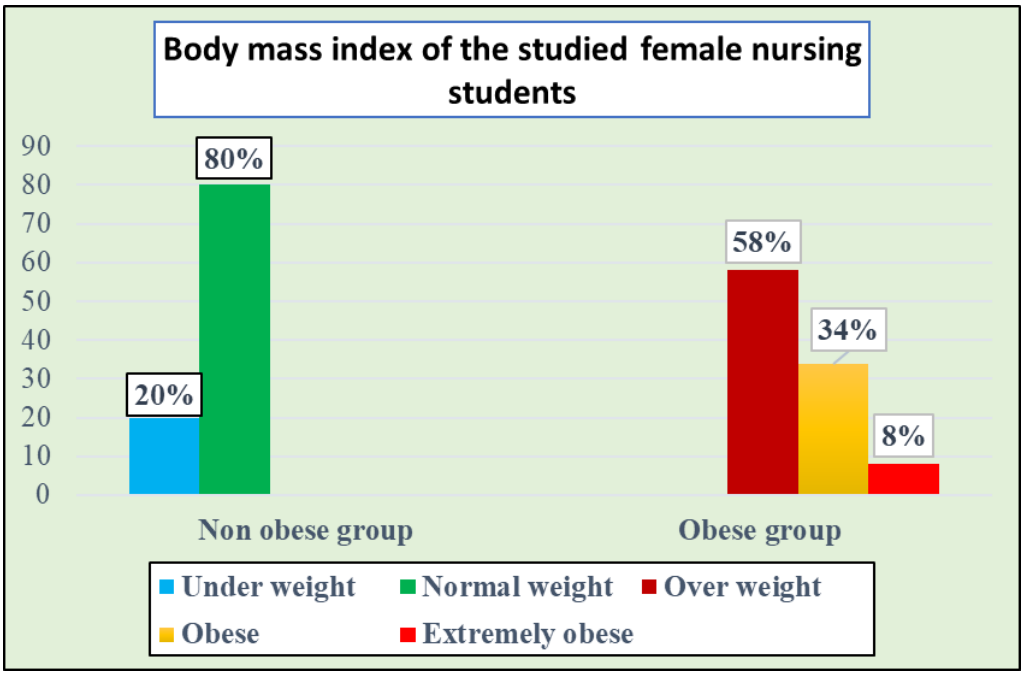

Figure (4): Percentage distribution of the studied female nursing students according to their body mass index (n=200).

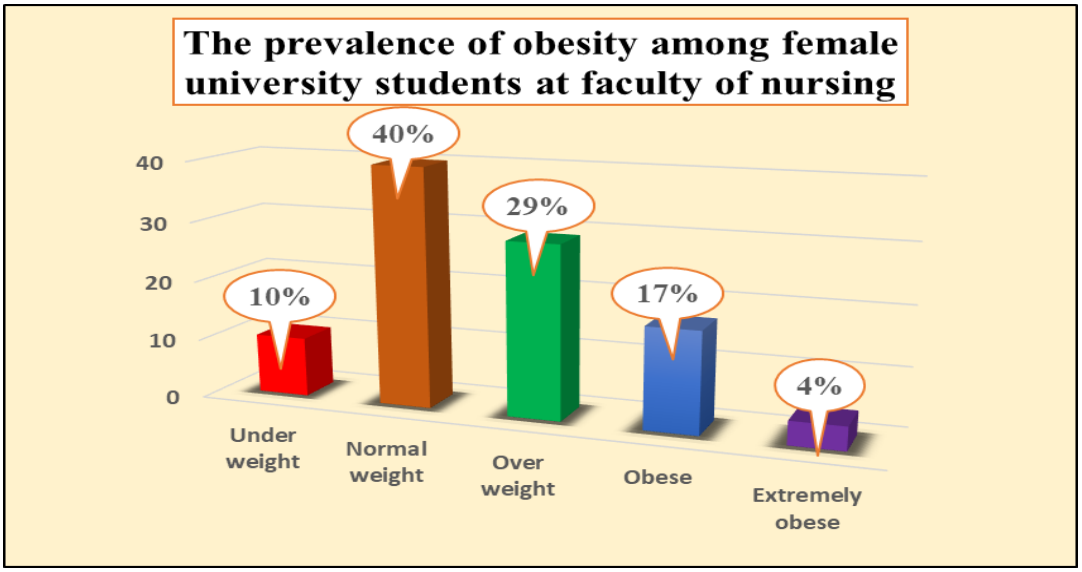

Figure (5): The prevalence of obesity among female university students at faculty of nursing.

Table (4): Relation between food habits of the studied obese female nursing students and their pain intensity during menstrual cycle (n=100).

Food habits		Pain Intensity during menstrual cycle						X^2	P-Value
		Moderate pain (n=30)		Severe pain (n=60)		Very severe pain (n=10)			
		No.	%	No.	%	No.	%		
Eating meals on time regularly every day	Yes	8	26.7	0	0.0	0	0.0	90.77	0.000**
	No	1	3.3	59	98.3	10	100.0		
	Sometimes	21	70.0	1	1.7	0	0.0		
Eating daily breakfast before going to university	Yes	12	40.0	0	0.0	0	0.0	76.65	0.000**
	No	0	0.0	53	88.3	10	100.0		
	Sometimes	18	60.0	7	11.7	0	0.0		
Eating fast food	Yes	0	0.0	48	80.0	10	100.0	67.44	0.000**
	No	12	40.0	0	0.0	0	0.0		
	Sometimes	18	60.0	12	20.0	0	0.0		
Eating entertainment during the day	Yes	0	0.0	44	73.3	10	100.0	54.02	0.000**
	No	2	6.7	0	0.0	0	0.0		
	Sometimes	28	93.3	16	26.7	0	0.0		
Drinking soft drinks between meals	Yes	0	0.0	46	76.7	10	100.0	71.85	0.000**
	No	18	60.0	0	0.0	0	0.0		
	Sometimes	12	40.0	14	23.3	0	0.0		
Method of cooking food in home	Foundry	29	96.7	33	55.0	0	0.0	51.36	0.000**
	Forged	1	3.3	13	21.7	10	100.0		
	Boiled	0	0.0	14	23.3	0	0.0		
Following a specific diet (Healthy diet)	Yes	8	26.7	0	0.0	0	0.0	62.02	0.000**
	No	9	30.0	60	100.0	10	100.0		
	Sometimes	13	43.3	0	0.0	0	0.0		

X^2= Chi-square test. No statistically significant at p > 0.05. * Statistically significant at p ‹ 0.05. **: Highly statistically significant at p < 0.01

Table (5): Relation between menstrual cycle data of the studied obese female nursing students and their pain intensity during menstrual cycle (n=100).

Menstrual cycle data		Pain Intensity during menstrual cycle						X^2	P-Value
		Moderate pain (n=30)		Severe pain (n=60)		Very severe pain (n=10)			
		No.	%	No.	%	No.	%		
Age of menarche (years)	<10 years	5	16.7	12	20.0	1	10.0	10.42	0.034*
	10-16 years	23	76.7	38	63.3	4	40.0		
	> 16 years	2	6.6	10	16.7	5	50.0		
Menstrual cycle regularity	Yes	30	100.0	24	40.0	0	0.0	42.02	0.000**
	No	0	0.0	36	60.0	10	100.0		
Menstrual cycle (days)	<21	9	30.0	2	3.3	0	0.0	104.28	0.000**
	21<25	21	70.0	1	1.7	0	0.0		
	25<30	0	0.0	32	53.3	0	0.0		
	30<35	0	0.0	7	11.7	2	20.0		
	>35	0	0.0	18	30.0	8	80.0		
Duration of menstrual blood flow (days)	<3	4	13.3	0	0.0	0	0.0	36.28	0.000**
	3-7	26	86.7	28	46.7	2	20.0		
	>7	0	0.0	32	53.3	8	80.0		
Amount of menstruation	Small	13	43.3	0	0.0	0	0.0	54.73	0.000**
	Moderate	17	56.7	18	30.0	4	40.0		
	Soaked/ heavy	0	0.0	42	70.0	6	60.0		
The form of menstrual bleeding	Liquid	10	33.3	9	15.0	1	10.0	10.39	0.034*
	Coagulated	2	6.7	0	0.0	0	0.0		
	Large blood clots	18	60.0	51	85.0	9	90.0		
Sleeping during period	Normal	20	66.7	2	3.3	2	20.0	44.07	0.000**
	Insomnia	10	33.3	58	96.7	8	80.0		
Feeling during period	Normal	6	20.0	0	0.0	0	0.0	16.31	0.012*
	Makes you disgusted	8	26.7	17	28.3	3	30.0		
	Lack of confidence	1	3.3	8	13.3	1	10.0		
	Nervous	15	50.0	35	58.4	6	60.0		
Eat certain foods during period	Yes	22	73.3	20	33.3	4	40.0	13.04	0.001**
	No	8	26.7	40	66.7	6	60.0		
History from interruption in menstrual period	Yes	2	6.7	42	70.0	9	90.0	38.31	0.000**
	No	28	93.3	18	30.0	1	10.0		

X^2= Chi-square test. No statistically significant at p > 0.05. * Statistically significant at p ‹ 0.05. **: Highly statistically significant at p < 0.01

Table (6): Correlation between body mass index and pain intensity during menstrual cycle among the studied female nursing students. (n=200).

Group	Variables	Pain intensity during menstrual cycle
Non obese group	**Body mass index**	r = -0.437- P = 0.000**
Obese group	**Body mass index**	r = 0.567 P = 0.000**

r= Spearman correlation coefficient test. P= p-value. (-) =Negative correlation.

****Highly statistically significant at p ‹ 0.01.**

Discussion:

The onset of menstruation is one of the most significant changes that occur during adolescence. It is a regular rhythmic phase that happens once a month and is a typical physiological phenomenon that lasts from menarche to menopause. Adolescent girls frequently experience menstrual abnormalities because they are strongly related to the processes that female pubertal development involves. One crucial measure of a woman's endocrine and reproductive health is her menstrual cycle **(Joseph et al., 2025)** Furthermore, it seems that normal ovulation depends on keeping a normal BMI. Deviations from this norm, whether due to an inadequate or excessive amount of body fat, affect ovarian function and result in menstruation issues **(Purba., Arto & Saragih 2023).**

Thus our comparative descriptive research study was carried out to evaluate the relationship between BMI and menstrual pattern among female nursing students at El Fayoum University. This aim was achieved through the present study findings which revealed a significant relation between BMI and the menstrual pattern among those adolescent girls after assessment of dietary habits, weight, height and BMI and evaluation of menstrual pattern of student girls (age of menarche, regularity and interval of menstrual cycle, duration of menses, amount of menstrual blood, PMS and menstrual pain intensity).

The current study revealed that the mean age of the obese group and the non-obese group was 19.07±0.60 years, near to three quarters of the obese and non-obese groups reside in rural areas, respectively. Also, more than half of the obese and non-

obese groups have insufficient income.

These findings were reinforced by an Egyptian study by **Ghazawy et al., (2022)** who carried out a study titled Obesity/Overweight among University students. Minia, Egypt, was in line with our study findings and reported that; the mean age of the studied group was (19.89 ± 1.47) and more than half of participants reside in rural areas.

From the researcher's point of view, these studies findings are not surprising as urban environment favor un healthy lifestyles (junk foods, physical inactivity, delayed sleeping time and fatty meals and soft drinks) that significantly affect body mass index specially among university students.

Concerning the menstrual pattern of the female students, the present study findings showed that more than three fifth of the obese group and more than three quarters of the non-obese students experienced menarche at the age range from 10 - 16 years old. More than two fifth of the obese students reported having irregular menstrual cycle. While, the majority of the non-obese group have regular menstrual cycle, more than one quarter of the obese students have cycle length >35 days while about half of the non- obese students have cycle length 25-30 days, more than half of the obese students and about four fifth of the non-obese students reported have a duration of menstrual period between 3-7 days. About two fifth of the obese group reported more than 7days as a duration of menstrual period, about half of the obese students reported a heavy amount of menstrual blood. **On the researcher's point of view,** excessive blood loss has been linked to ovulatory abnormalities, which are more prevalent in obese women, and may be related to underlying hormonal irregularities, such as hyperandrogenemia, which is how the prior results were explained.

Likewise, **(Elgendy et al., 2024)** who explored Menstrual Abnormalities and its Relation to Body Mass Index among Adolescent Girls, proved that; The majority of the cases were overweight and obese. Among the cases group, the most frequent menstrual abnormalities were heavy flow (more than one fifth of the subjects), variable cycle length flow (more than one fifth of the subjects), extended cycle length (about one quarter of the subjects) (oligo menorrhea), and lengthy flow days (about one quarter of the subjects).

As regards the knowledge about general causes of irregular menstruation, the findings of the present study indicated that the majority of two groups don't know the health factors that lead to irregular menstruation especially the weight. **We conclude that** there was a lack of knowledge about the relation between BMI and regular menstrual cycle among female nursing students. Thus fostering open discussions, promoting education, and encouraging timely medical consultations, we can reduce the stigma around menstruation and ensure that all women can manage their health confidently. Correspondingly, **(Ahmad et al., 2025)** found that just one fifth of the study sample had a high awareness of menstrual abnormalities and their causes, compared to two fifths of the study sample who had a low awareness and also two fifths of the study sample who had a moderate awareness.

Investigating the severity of premenstrual symptoms, the present study clarified that; about half of the obese group have experienced moderate PMS. While, the majority of the non-obese group had reported mild PMS and showed highly statistically significant differences between the non-obese and obese groups.

In this respect, **(Azadi et al., 2025)** who conducted a study titled Exploring the Factors Influencing Premenstrual Syndrome and Its Severity, indicated that more than two fifths of the individuals had a BMI higher than 25 kg/m2. The risk of premenstrual syndrome was significantly positively correlated with BMI. Contrary, **(Kharb et al., 2022)** who evaluated Correlation of Body mass index with premenstrual syndrome and age at menarche in medical students, highlighted that although half of the study group had PMS, only more than one fifth of them had a high BMI, and there was a weak relationship between PMS and BMI values.

Considering the severity of pain during menstrual period, the present study revealed that; about three fifth of the obese group reported suffering from severe pain during their menstrual period while, about half of the non-obese group reported suffering from moderate pain during menstrual period, the majority of the obese and non-obese students experienced pain before menstrual period in lower back and lower abdomen. More than three fifth of the obese group and near to half of

the non-obese group felt pain with the first period (menarche).

Likewise, **(Aktaş et al., 2023)** who evaluated the relationships between primary dysmenorrhea with body mass index and nutritional habits in young women, proved that almost half of the sample individuals had primary dysmenorrhea. Menstrual pain was 7.16 ± 1.95 on average. In addition, young women who were overweight or obese by body mass index had higher frequency of primary dysmenorrhea than those who were underweight or normal. Women who were overweight/obese according to body mass index compared to those who were underweight and normal.

On the other hand, **(Donayeva et al., 2023)** who performed a study titled The relation between primary dysmenorrhea in adolescents and body mass index, indicated that the underweight teenage group (8.7 ±0.8) had a statistically higher visual analogue scale of dysmenorrhea than the normal-weight (6.5 ±0.5) and overweight (6.3 ±0.6) adolescent groups.

Findings of the present study concluded that; there was highly statistically significant relation between pain intensity during menstrual cycle among the studied groups (obese and non-obese) and their eating habits as regularity of meal times, having fast food, soft drinks. **From the researcher's point of view**, this may be due to the hormonal changes during the menstrual cycle have a significant impact on eating habits. An awareness of these changes can help women control their food intake and maintain normal weight. Reinforced such findings **(Wahyuni et al., 2024)** who performed a study titled Diet and Menstrual Disorders in Women of Fertile Age. also explained that the frequency of junk food consumption and menstrual cycle abnormalities were significantly correlated.

Regarding the menstrual cycle data, findings of the present study clarified that; there was highly statistically significant relation between pain intensity during menstrual cycle among the studied groups (obese and non-obese students) and their menstrual cycle regularity, menstrual cycle (days), duration of menstrual blood flow (days), amount of menstruation, sleeping during period, eating certain foods during period and history from interruption in menstrual period. Also, there was statistically significant relation with age of menarche, the form of

menstrual bleeding, feeling during period.

The previous results are similar to **(Duman et al., 2022)** who assessed Risk factors for primary dysmenorrhea and the effect of complementary and alternative treatment methods: Sample from Corum, Turkey discovered that there were statistically significant correlations between the incidence of dysmenorrhea, the history of menorrhagia, and the history of early menstruation.

Concerning BMI, results of the present study showed that; there was highly statistically significant relation between pain intensity during menstrual cycle among the studied obese female nursing students and body mass index. **From the perspective of the researcher,** high body fat mass is influenced by excess adipose tissue and an elevated BMI. The synthesis of progesterone and estrogen is affected by this. An increase in estrogen and progesterone will result in high prostaglandin levels, which in turn will promote ischemia and more uterine contractions, ultimately leading to dysmenorrhea during menstruation.

These results match the findings of the study by, **(Donayeva et al., 2023).** Highlighted that primary dysmenorrhea was significantly impacted by BMI differences; both the obese and underweight groups experienced higher pain intensity and a lower pressure pain threshold compared to the normal weight and overweight groups.

Conclusion:

Based on the research and research questions, the study concluded that there is There was highly statistically significant negative correlation between body mass index and pain intensity during menstrual cycle among the studied none obese female nursing students. On the other hand, there was highly statistically significant positive correlation between body mass index and pain intensity during menstrual cycle among the studied obese female nursing students.

Recommendations:

Based on the findings of this study the following recommendations are derived and suggested:

1. Ongoing training and professional development for healthcare professionals regarding the most recent recommendations, findings, and best practices for treating menstrual health and irregularities.
2. Incorporate knowledge addressing menstruation and abnormalities into the nursing curriculum.

3. Undergraduate based programs must be reconstructed to improve student's knowledge about factors contributing to overweight and its complications, the importance of following a healthy lifestyle habits as possible such as healthy eating habits, exercise.

Further research:

1. Explore the obstacles that female students have while trying to obtain menstrual health and gynecological care, and suggest ways to increase utilization.
2. Additional research on obesity and the nurse's role in preventing it are suggested for a sizable sample.
3. Investigate how irregular menstruation affects women's health and academic achievement.

References:

Abdel-Baset Taha, O., Mohamed Abd Elaal, E., & Gamal Eldein Ibrahiem, S. (2023). Healthy Lifestyle among Adolescents Students through Electronic Platform. *Journal of Nursing Science Benha University, 4*(2), 809-821. doi:10.21608/jnsbu.2023.310619

Aboulghate, M., Elaghoury, A., Elebrashy, I., Elkafrawy, N., Elshishiney, G., Abul-Magd, E., ... & Vokó, Z. (2021). The burden of obesity in Egypt. *Frontiers in public health, 9*, 718978.doi:10.3389/fpubh.2021.718978. PMID: 34513789; PMCID: PMC8429929.

Ahmad, P. A., Abbas, A. F., & Qadir, N. S. M. (2025). Awareness of Menstrual Abnormalities among Female Nursing Students at the University of Sulaimani. UHD *Journal of Science and Technology, 9*(1), 65-72. https://doi.org/10.21928/uhdjst.v9n1y2025.pp65-72

Aktaş, D., Külcü, D. P., & Şahin, E. (2023). The relationships between primary dysmenorrhea with body mass index and nutritional habits in young women. *J Educ Res Nurs, 20*(2), 143-9. https://doi.org/10.14744/jern.2021.93151.

Attia, G., Alharbi, O., & Aljohani, R. (2023). The Impact of Irregular Menstruation on Health: A Review of the Literature. *Cureus, 15*(11), 1-9. https://doi.org/10.7759/cureus.49146.

Azadi, H., Madani, S., Payahoo, L., & Khodayari, M. T. (2024). Exploring the Factors Influencing Premenstrual Syndrome and Its Severity: The Role of Lifestyle Determinants. *Journal of*

Reproduction & Infertility, 25(4),264. https://doi.org/10.18502/jri.v25i4.18124.

Bahari, R., Shokravi, F. A., Anosheh, M., & Moridi, M. (2021). Effect of a health education program on puberty knowledge among visually impaired female adolescent students. *Medical journal of the Islamic Republic of Iran, 35*, 74**.** doi:10.47176/mjiri.35.74PMID: 34290998; PMCID: PMC8285547.

Czlapka-Matyasik, M., Bykowska-Derda, A., Stelcer, B., Nowicka, A., Piasecka, A., Kałużna, M., ... & Ziemnicka, K. (2025). Self-Esteem Differentiates the Dietary Behaviours and Adipose Tissue Distribution in Women with Menstrual Bleeding Disorders—Pilot Study. *Applied Sciences, 15*(7):(2076-3417) https://doi.org/10.3390/app15073701.

Daly, A. N., O'Sullivan, E. J., & Kearney, J. M. (2022). Considerations for health and food choice in adolescents. *Proceedings of the Nutrition Society, 81*(1), 75-86. doi: 10.1017/S0029665121003827. Epub 2021 Nov 29. PMID: 35039094.

De Silva, N., & Tyson, N. (2024). Essentials of Pediatric and Adolescent Gynecology-E-Book (9th ed.). India: *Elsevier Health Sciences.*

Desmawati, D., Berliani, H., & Utama, B. I. (2024). Menstrual Cycle Variations Observed in Obese and Normal-Weight Women. *Indonesian Journal of Human Nutrition, 11*(1), 44-52.

Donayeva, A., Amanzholkyzy, A., Nurgaliyeva, R., Gubasheva, G., Abdelazim, I., & Samaha, I. I. (2023). The relation between primary dysmenorrhea in adolescents and body mass index. Menopause Review/Przegląd Menopauzalny, 22(3), 126-129. doi: 10.5114/pm.2023.131314. Epub 2023 Sep 20. PMID: 37829266; PMCID: PMC10566326.

Duman, N. B., Yıldırım, F., & Vural, G. (2022). Risk factors for primary dysmenorrhea and the effect of complementary and alternative treatment methods: Sample from Corum, Turkey. *International journal of health sciences, 16*(3), 35

Elgendy, H., Mohamed, S., & Bendary, A. (2024). Menstrual Abnormalities and its Relation to Body Mass Index Among Adolescent Girls. *Evidence Based Women's Health Journal, 14*(2),

210-214. doi:10.21608/ebwhj.2024.268898.1299

Elnagar, M. A. E. R., & Awed, H. A. E. M. (2015). Self â€“Care Measures Regarding Premenstrual Syndrome Among Female Nursing Students. *International Journal of Nursing Didactics, 5*(02), 01-10. http://dx.doi.org/10.15520/ijnd.2015.vol5.iss02.53.01-10

Grace, G. A., Edward, S., & Gopalakrishnan, S. (2021). Dietary habits and obesity among adolescent school children: A case control study in an urban area of kancheepuram district. Indian *Journal of Community Medicine, 46*(4), 637-640.https://doi.org/10.4103/ijcm.IJCM_1013_20.

Joseph A, Bhorania S, Michael J. (2025). A Study On the Correlation Between Body Mass Index and The Age at Menarche Among Young Females. *Int J Med Pub Health; 15* (1); 1341-1345. DOI:10.70034/ijmedph.2025.1.250

Kharb, A., Dey, R., & Singh, V. K. (2022). Correlation of Body mass index with premenstrual syndrome and age at menarche in medical students. *National Journal of Physiology, Pharmacy and Pharmacology, 12*(1), 30-30. doi:10.5455/njppp.2022.11.05165202126072021

Nicola Ghatas, V., Sobhy Abdelfatah Asran Abdou, A., Mohamed Essa, R., & Gomaa Elgamal, E. (2024). Factors Associated with Menstrual Irregularities among Female Nursing Students. Egyptian Journal of Health Care, 15(3), 913-929.doi:10.21608/ejhc.2024.381035

Odongo, E., Byamugisha, J., Ajeani, J., & Mukisa, J. (2023). Prevalence and effects of menstrual disorders on quality of life of female undergraduate students in Makerere University College of health sciences, a cross sectional survey. *BMC women's health, 23*(1), 152.https://doi.org/10.1186/s12905-023-02290-7

Purba, S. O., Arto, K. S., & Saragih, R. A. C. (2023). Overweight and menstrual disorders in girls aged 12-15 years. *Paediatrica Indonesiana, 63*(6), 499-505. DOI: https://doi.org/10.14238/pi63.6.2023.499-505

Raouf, N. R., Mahfouz, E. M., Seedhom, A. E., Ghazawy, E. R., & Abdelrehim, M. G. (2022). The risk of Obesity in relation to

dietary habits among medical students at Minia University: Faculty of medicine, Minia, Egypt. *Minia Journal of Medical Research, 33*(4), 105-114.doi:10.21608/mjmr.2022.166298.1195

Taheri, R., Ardekani, F., Shahraki, H., Esfahani, N., & Hajiahmadi, S. (2020). Nutritional status and anthropometric indices in relation to menstrual disorders: a cross-sectional study. Journal of nutrition and metabolism, 20(3), 1-7. https://doi.org/10.1155/2020/5980685

Gcawu, S. N., & van Rooyen, D. (2022). Clinical teaching practices of nurse educators: An integrative literature review. *Health SA Gesondheid,]27*,1728.https://doi.org/10.4102/hsag.v27i0.172

Verma, V., Kanti, V., & Singh, N. p. (2020). Study of Menstrual Abnormalities and its Association with Demographic Factors among Female Medical Students. *Journal of Clinical & Diagnostic Research, 14*(8), 1-6.DOI:10.7860/JCDR/2020/44086.13957.

Wahyuni, Y., Sukarno, A., Fadhilla, R., Novianti, A., & Dewi, T. L. (2024). Diet and Menstrual Disorders in Women of Fertile Age. JPK: *Journal Proteksi Kesehatan, 13*(2),171-177. https://doi.org/10.36929/jpk.v13i2.962.