

## Research Article:

# Menstrual Disorder in Morbid Obese Patients, Compared to Normal-weighted Controls



Zeinab Tamannaie<sup>1</sup> , Fatemeh Jesmi<sup>2</sup> , Meisam Akhlaghdoust<sup>2</sup> , Shahla Chaichian<sup>2\*</sup> , Abdolreza Pazouki<sup>1</sup> , Somayeh Mokhber<sup>1</sup> , Mohadeseh Pishgahroudsari<sup>1</sup> 

1. Minimally Invasive Surgery Research Center, Iran University of Medical Sciences, Tehran, Iran.

2. Pars Advanced and Minimally Invasive Medical Manners Research Center, Pars Hospital, Iran University of Medical Sciences, Tehran, Iran.



**Please cite this article as** Tamannaie Z, Jesmi F, Akhlaghdoust M, Chaichian Sh, Pazouki A, Mokhber S, et al. Menstrual Disorder in Morbid Obese Patients, Compared to Normal-weighted Controls. *Annals of Bariatric Surgery*. 2021; 10(1):31-36. <http://dx.doi.org/10.32598/ABS.10.1.11>

 <http://dx.doi.org/10.32598/ABS.10.1.11>



### Article info:

Received: 25 May 2021

Accepted: 18 Jun 2021

Publish: 30 Jun 2021

### Keywords:

Menstruation disturbances, Obesity, Body Mass Index

## ABSTRACT

**Background:** The present study aimed to evaluate the association between menstrual cycle disorders and obesity in Iranian women.

**Methods and Materials:** In the present case-control study, 405 obese women of reproductive age who were referred to the Obesity Clinic of Minimally Invasive Surgery Research Center, Rasoul-e-Akram Hospital, in Tehran City, Iran between Jan 2013 and Oct 2015 were included as the case group. Moreover, they were compared with a control healthy-weight group, selected from their family members (n=293). Menstrual cycle characteristics were documented in a researcher-designed checklist. All statistical analyses were performed in SPSS and STATA.

**Results:** In the case group, 47(11.6%) women had irregular menstrual cycles, while it existed in 22(7.5%) members of the control group ( $P<0.001$ ). The prevalence of different menstrual disorders was as follows: polymenorrhea 107(26.4%) in the cases and 51(17.4%) in the controls ( $P<0.001$ ); oligomenorrhea 22(5.4%) in the cases and 16(5.5%) in the controls ( $P<0.001$ ).

**Conclusion:** The present study results indicated that morbid obesity increases the risk of menstrual irregularities and dysmenorrhea; therefore, it is essential to pay greater attention to this issue in morbidly obese patients for the proper management of this disturbing comorbidity.

## 1. Introduction

Obesity and overweight are growing public health problems in numerous countries, as they elevate the global risk of severe morbidity and mortality [1]. The prevalence of obesity is estimated to be approximately 22% in Iranian adults [2].

Morbid obesity increases the risk of cardiovascular diseases, diabetes mellitus, as well as gynecological problems, including infertility, Polycystic Ovarian Syndrome (PCOS), and menstruation disturbances [3]. PCOS, a common endocrine disorder, characterized by clinical and biochemical hyperandrogenism and chronic anovulation, polycystic ovaries in ultrasonography findings, is frequently associated with morbid obesity [4]. The prevalence of

### \* Corresponding Author:

Shahla Chaichian, MD.

Address: Pars Advanced and Minimally Invasive Medical Manners Research Center, Pars Hospital, Iran University of Medical Sciences, Tehran, Iran.

E-mail: shchaichian@gmail.com

menstrual disorders differs among various countries; it is reported as high as 30.1% in some Iranian studies [5]. Several studies identified a two-fold increase in the prevalence of menstrual cycle irregularities in obese women of reproductive age; that rate is hypothesized to be due to the increased secretion of testosterone from and peripheral adipose tissue [6, 7]. Additionally, most cases of menstruation irregularities resolve after obesity surgery [8].

However, cultural and geographical issues, such as light exposure, work-shifts, diet, and sleep pattern affect menstrual cycles, as well as obesity status [9-11]; thus, it is essential to separately study the prevalence of menstruation disturbances and their association with obesity in different nations. Iranian studies addressing the prevalence and the factors associated with menstrual disorders in Iranian women are scarce. The available studies have focused on adolescents or included insufficient sample sizes [12-14]. Therefore, the present study aimed to examine the association between menstrual cycle disorders and obesity in Iranian obese females, compared to their healthy-weighted counterparts, to understand the impact of obesity on menstrual irregularity.

## 2. Materials and Methods

The present case-control study enrolled 405 consecutive obese women of reproductive age (aged 15-50 years) who were referred to the Obesity Clinic of Minimally Invasive Surgery Research Center, a referral outpatient center at Rasoul-e-Akram Hospital, in Tehran City, Iran between Jan 2013 and Oct 2015. This study was approved by the Research Ethics Committee of Iran University of Medical Sciences and the study participants provided a signed written informed consent form.

After the inclusion of patients as the case group, by convenience sampling method, eligible control subjects consisted of healthy-weight family members of the cases ( $n=293$ ), obtained through frequency matching. The exclusion criteria of the case group consisted of current breastfeeding, pregnancy, menopause, documented PCOS (according to Rotterdam criteria), a history of ovulation disorders, uterine/genitalia abnormalities, uterine fibroids, and using contraceptives in the past 6 months. After consultation, the research participants were visited and interviewed by a gynecologist, who recorded the patient's age and menstrual cycle characteristics, documented in a written questionnaire.

In the checklist, menstrual cycle characteristics, including the intervals between the menstrual cycles, the duration of the menstrual cycles, the extent of menstrual

bleeding, and menstrual cycle changes during the past 12 months were probed.

Menstrual cycles were defined as a short cycle or polymenorrhea ( $\leq 25$  days), normal cycle (26–34 days), and long cycle or oligomenorrhea ( $\geq 35$  days). If it followed no similar pattern, it was considered irregular. Dysmenorrhea was considered positive menstrual pain.

Furthermore, a research team member documented the study participant's weight and height for calculating Body Mass Index (BMI) as weight in kilograms divided by squared height in meters ( $\text{kg}/\text{m}^2$ ). The study participants' height was measured by a wall measuring tape using a digital stadiometer (Seca Inc, USA) with an accuracy of 0.1 cm in a barefoot standing position. The research participants' weight was measured by a calibrated digital weight scale with a measurement accuracy of 0.1 kg with light clothing. The international classification of adult underweight, overweight, and obesity according to BMI (World Health Organization classification) was considered in the present study; it classifies BMI 18-24.99  $\text{kg}/\text{m}^2$  as normal and  $\geq 40 \text{ kg}/\text{m}^2$  as class III (morbid) obesity.

We used SPSS and STATA for statistical analysis. The quantitative data were expressed as Mean $\pm$ Standard Deviation (SD) with 95% Confidence Intervals (95%CI); for the qualitative data, the frequency was used. The Chi-squared test and Independent Samples t-test was used to compare the collected qualitative and quantities data, respectively. To evaluate the association between regular/irregular menstruation, dysmenorrhea, polymenorrhea, and oligomenorrhea between non-obese and obese participants, we used logistic regression analysis; we calculated Odds Ratio (OR) and 95% CIs for this purpose.

## 3. Results

We included 405 morbidly obese women (case group) with the Mean $\pm$ SD age of  $33.72\pm 7.77$  years and the mean $\pm$ SD BMI of  $37.55\pm 8.64 \text{ kg}/\text{m}^2$  as well as 293 normal-weight women (control group) with the Mean $\pm$ SD age of  $27.42\pm 7.24$  years and the Mean $\pm$ SD BMI of  $21.82\pm 1.70 \text{ kg}/\text{m}^2$ ; the research groups were comparable regarding mean age ( $P>0.05$ ) (Table 1).

In the case group, there were 125 women with irregular menstrual cycles, representing a prevalence of irregular menstrual cycles of 30.9%. Moreover, in the control group, the prevalence was calculated as 17.1% ( $n=50$ ) (OR=1.99, 95%CI=1.00-3.01) (Tables 2 & 3). The prevalence of polymenorrhea was equal to 64% ( $n=80$ ) in the case group, i.e., significantly lower in the control

**Table 1.** Comparing the baseline characteristics of the study groups

Variable	Mean±SD		P	95%CI	
	Non-obese Group (n=293)	Obese Group (n=405)		Min.	Max.
Age, y	27.42±7.24	33.72±7.77	0.0001	-30.09	-28.63
Height, m	164.15±6.50	162.41±5.93	0.0001	-162.03	-161.09
Weight, kg	58.88±6.51	99.03±23.06	0.0001	-82.56	-78.63
BMI, kg/m <sup>2</sup>	21.82±1.70	37.55±8.64	0.0001	-30.10	-28.63



group (48%, n=24) (OR=1.66, 95%CI=1.18-2.34). The prevalence of oligomenorrhea was measured to be 36% (n=45) in the case group, i.e., significantly lower in the control group (52%, n=26) (OR=1.90, 95%CI=1.23-2.18) (Tables 2 & 3). The prevalence of dysmenorrhea was significantly higher in the case group (64.2%, n=260), compared to the control group (41.9%, n=123) (P<0.001, OR=2.55, 95%CI=1.20-3.82).

#### 4. Discussion

In the present study, the prevalence of menstruation disturbances morbidly was compared between the obese

women of reproductive age with matched-for-age normal-weighted controls. As per the collected results, there was a nearly two-fold (OR=1.99) increase in the prevalence of irregular menstrual cycles in the obese group (30.9%), compared to the controls (17.1%), as well as polymenorrhea (64% vs. 48%, respectively), and dysmenorrhea (64.2% vs. 41.9%, respectively); however, the prevalence of oligomenorrhea was approximately two-fold higher (OR=1.90) in the control group (52%), compared to the case group (36%).

Menstrual cycle disturbances and obesity are of great importance, as they can impair the quality of life and

**Table 2.** The menstrual characteristics of the study groups

Variable		No. (%)		P
		Non-obese Group (n=293)	Obese Group (n=405)	
Regular menstruation	Yes	243(82.9)	280(69.1)	0.0001
	No	50(17.1)	125(30.9)	
Intermenstrual bleeding (Spotting)	Yes	79(26.9)	78(19.3)	0.0001
	No	214(73.1)	327(80.7)	
Menorrhagia	Yes	22(7.5)	52(12.8)	0.0001
	No	271(92.5)	353(87.2)	
Premenstrual bleeding (Spotting)	Yes	84(28.6)	128(31.6)	0.0001
	No	209(71.4)	277(68.4)	
Premenstrual syndrome (PMS)	Yes	190(64.8)	304(75.1)	0.0001
	No	103(35.2)	101(24.9)	
Dysmenorrhea	Yes	123(41.9)	260(64.2)	0.0001
	No	170(58.1)	145(35.8)	



**Table 3.** The logistic regression analysis data of the factors associated with obesity and non-obesity

Variable	No. (%)		OR	P	95%CI	
	Non Obese Group (n=293)	Obese Group (n=405)			Min.	Max.
Regular menses*	243(82.9)	280(69.1)	0.15	0.0001	0.084	0.285
Irregular menses*	50(17.1)	125(30.9)	1.99	0.026	1.005	3.010
Polymenorrhea	24(48)	80(64)	1.66	0.003	1.182	2.346
Oligomenorrhea	26(52)	45(36)	1.90	0.017	1.231	2.181
Dysmenorrhea*	123(41.9)	260(64.2)	2.55	0.003	1.200	3.828

\*0: Non-obese and 1: Obese



fertility of the woman [15]; therefore, studying the association of obesity and menstruation disturbances is of high significance. Several studies have addressed this issue worldwide. Nevertheless, studies on Iranian women are scarce. In the study by Castillo-Martínez et al., the prevalence of irregular menstruation was measured to be 34.4% in obese women [6], i.e., close to the percentage in the present study (30.9%). Similarly, they reported a significant association between menstrual cycle irregularities and the grade of obesity, independent of PCOS or diabetes mellitus [6], i.e., in line with the present study data. Other studies have also documented a higher frequency of menstrual irregularities in obese and morbidly obese women, including irregular cycles, polymenorrhea, and oligomenorrhea [16, 17], which support the present study findings. Wei et al. also reported a two-fold increase in the prevalence of irregular cycles in obese patients (26% in patients with a BMI  $\geq 30$  kg/m<sup>2</sup> vs. 14% in patients with a BMI  $< 30$  kg/m<sup>2</sup>) [7], i.e., consistent with the current research results. However, in their study, obese patients presented a higher frequency of long cycles (clinically parallel to oligomenorrhea) and lower frequency of short cycles (clinically parallel to polymenorrhea), which oppose the results of the current study; in the present study, polymenorrhea was more frequent in morbidly obese patients and oligomenorrhea was more prevalent in normal-weighted than morbidly obese patients. These data discrepancies can be attributed to multiple issues. First, the measurement of BMI (self-report vs. measurement) and the method of recording the data of the participants' menstruation are different among studies that can affect the results. Second, the patients of the case group in the present study were morbid obese patients (BMI  $\geq 40$  kg/m<sup>2</sup>), while the results of previous studies reported the results for obese patients without classification of obesity grade [7]. All the above-mentioned studies confirmed higher menstrual irregularities

in obese patients, compared to the normal-weighted population, i.e., in line with the present study, despite some minor discrepancies in details. Considering multiple factors that affect menstrual cycles, these differences are justifiable. Due to the significance of menstrual disorders in women's life, it is essential to pay further attention to this issue in morbidly obese patients.

Another critical finding of the present study was the higher prevalence of dysmenorrhea in the case group (64.2%), compared to the controls (41.9%). Previous international and domestic studies have also investigated obesity as a risk factor for dysmenorrhea. Ju et al. reported a 1.22-fold increased risk of dysmenorrhea in obese patients in a U-shaped association [18], i.e., consistent with the results of the present study. However, in the present study, the OR of dysmenorrhea was higher than their study; it can be justified to be due to the selection of morbidly obese patients in the current study. In a review study, various factors have been associated with dysmenorrhea, including age, parity, oral contraceptives use, stress, and positive family history, although obesity failed to demonstrate a significant association in this respect [19]. Another study (on the Iranian population) considered obesity not associated with dysmenorrhea [20]; however, in the present study, morbidly obese patients provided a 2.5-fold higher risk of dysmenorrhea. This discrepancy can be since we have only considered morbid obese patients that can have different health statuses than other obesity categories.

The main strength of the present study included studying the association between morbid obesity and menstrual disorders, compared to a matched control group, in the Iranian population, i.e., disregarded before. Furthermore, the study results might have been affected by some limitations, like selecting participants from one center and one city

of Iran, which limits the generalizability of the results to the whole Iranian population. Moreover, the data on the menstrual cycles of patients was collected by self-report, which can be affected by recall bias, i.e., due to the nature of the data. Additionally, we only measured BMI, while other parameters, like upper-body fat and waist circumference, could also affect the collected results.

## 5. Conclusion

The present study data indicated that morbid obesity increases the risk of menstrual irregularities and dysmenorrhea; therefore, it is essential to pay greater attention to this issue in morbidly obese patients for the proper management of this disturbing comorbidity.

## Ethical Considerations

### Compliance with ethical guidelines

This study was approved by the Research Ethics Committee of Iran University of Medical Sciences. All ethical principles are considered in this article. The participants were informed about the purpose of the research and its implementation stages. They were also assured about the confidentiality of their information. They were free to leave the study whenever they wished, and if desired, the research results would be available to them.

### Funding

This research did not receive any grant from funding agencies in the public, commercial, or non-profit sectors.

### Authors' contributions

All authors equally contributed to preparing this article.

### Conflict of interest

The authors declared no conflict of interest.

## References

- [1] Nguyen DM, El-Serag HB. The epidemiology of obesity. *Gastroenterology Clinics of North America*. 2010; 39(1):1-7. [DOI:10.1016/j.gtc.2009.12.014] [PMID] [PMCID]
- [2] Rahmani A, Sayehmiri K, Asadollahi K, Sarokhani D, Islami F, Sarokhani M. Investigation of the prevalence of obesity in Iran: A systematic review and meta-analysis study. *Acta Medica Iranica*. 2015; 53(10):596-607. [PMID]
- [3] Ricci MA, De Vuono S, Scavizzi M, Gentili A, Lupattelli G. Facing morbid obesity: How to approach it. *Angiology*. 2016; 67(4):391-7. [DOI:10.1177/0003319715595735] [PMID]
- [4] Dehdashtihaghighat S, Mehdizadehkashi A, Arbabi A, Pishgahroudsari M, Chaichian S. Assessment of C-reactive protein and C3 as inflammatory markers of insulin resistance in women with polycystic ovary syndrome: A case-control study. *Journal of Reproduction & Infertility*. 2013; 14(4):197-201. [PMID] [PMCID]
- [5] Harlow SD, Campbell OMR. Epidemiology of menstrual disorders in developing countries: A systematic review. *An International Journal of Obstetrics & Gynaecology*. 2004; 111(1):6-16. [DOI:10.1111/j.1471-0528.2004.00012.x] [PMID]
- [6] Castillo-Martínez L, López-Alvarenga JC, Villa AR, González-Barranco J. Menstrual cycle length disorders in 18-to 40-y-old obese women. *Nutrition*. 2003; 19(4):317-20. [DOI:10.1016/S0899-9007(02)00998-X] [PMID]
- [7] Wei S, Schmidt MD, Dwyer T, Norman RJ, Venn AJ. Obesity and menstrual irregularity: Associations with SHBG, testosterone, and insulin. *Obesity*. 2009; 17(5):1070-6. [DOI:10.1038/oby.2008.641] [PMID]
- [8] Teitelman M, Grotegut CA, Williams NN, Lewis JD. The impact of bariatric surgery on menstrual patterns. *Obesity Surgery*. 2006; 16(11):1457-63. [DOI:10.1381/096089206778870148] [PMID]
- [9] Barron ML. Light exposure, melatonin secretion, and menstrual cycle parameters: An integrative review. *Biological Research for Nursing*. 2007; 9(1):49-69. [DOI:10.1177/1099800407303337] [PMID]
- [10] Attarchi M, Darkhi H, Khodarahmian M, Dolati M, Kashanian M, Ghaffari M, et al. Characteristics of menstrual cycle in shift workers. *Global Journal of Health Science*. 2013; 5(3):163-72. [DOI:10.5539/gjhs.v5n3p163] [PMID] [PMCID]
- [11] Chaichian S, Moazzami B, Jesmi F, Pazouki A, Pishgahroudsari M, Mokhber S, et al. The controversy of the most proper time for pregnancy after bariatric surgery: A review of ten cases. *Obesity Surgery*. 2016; 26(6):1352-6. [DOI:10.1007/s11695-016-2124-1] [PMID]
- [12] Samara-Boustani D, Colmenares A, Elie C, Dabbas M, Beltrand J, Caron V, et al. High prevalence of hirsutism and menstrual disorders in obese adolescent girls and adolescent girls with type 1 diabetes mellitus despite different hormonal profiles. *European Journal of Endocrinology*. 2012; 166(2):307-16. [DOI:10.1530/EJE-11-0670] [PMID]
- [13] Soltani F, Shobeiri F. [Menstrual patterns and its disorders in high school girls (Persian)]. *Iranian Journal of Obstetrics, Gynecology and Infertility*. 2011; 14(1):28-36. <http://eprints.mums.ac.ir/id/eprint/5467>
- [14] Noroozi A, Tahmasebi R. [Pattern of menstruation, hirsutism and dysmenorrhea in students of Boushehr Medical and Khalig-e-Fars Universities (2002-2003) (Persian)]. *Hormozgan Medical Journal*. 2004; 7(4):203-9. <https://www.sid.ir/fa/journal/ViewPaper.aspx?ID=6013>
- [15] Axmon A, Rylander L, Albin M, Hagmar L. Factors affecting time to pregnancy. *Human Reproduction*. 2006; 21(5):1279-84. [DOI:10.1093/humrep/dei469] [PMID]
- [16] Seif MW, Diamond K, Nickkho-Amiry M. Obesity and menstrual disorders. *Best Practice & Research Clinical Ob-*



- stetrics & Gynaecology. 2015; 29(4):516-27. [DOI:10.1016/j.bpobgyn.2014.10.010] [PMID]
- [17] Souza FA, Dias R, Fernandes CE, Pimentel F, Dias D. Menstrual irregularity: A possible clinical marker of metabolic dysfunction in women with class III obesity. *Gynecological Endocrinology*. 2010; 26(10):768-72. [DOI:10.3109/09513590.2010.487603] [PMID]
- [18] Gardella C, Johnson KM, Dobie DJ, Bradley KA. Prevalence of hysterectomy and associated factors in women Veterans Affairs patients. *The Journal of Reproductive Medicine*. 2005; 50(3):166-72. [PMID]
- [19] Ju H, Jones M, Mishra G. The prevalence and risk factors of dysmenorrhea. *Epidemiologic Reviews*. 2014; 36:104-13. [DOI:10.1093/epirev/mxt009] [PMID]
- [20] Tavallaee M, Joffres MR, Corber SJ, Bayanzadeh M, Mahmoudi Rad M. The prevalence of menstrual pain and associated risk factors among Iranian women. *The Journal of Obstetrics and Gynaecology Research*. 2011; 37(5):442-51. [DOI:10.1111/j.1447-0756.2010.01362.x] [PMID]