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Predictive factors of maternal obesity and its effects on pregnancy symptoms and sexuality: a hospital-based study

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Abstract

Background Pregnancy is one of the periods when women of reproductive age have a high risk of weight gain, and maternal obesity is an important risk factor in this period. This study aimed to investigate the predictive factors of maternal obesity and its impact on pregnancy symptoms and sexual function in pregnant women living in the Eastern Mediterranean region of southern Türkiye.

Methods This study utilized a cross-sectional, hospital-based, and multi-center design. The study was participated in by 647 pregnant women. Data were collected through the Socio-demographic Form, the Pregnancy Symptoms Inventory, and the Female Sexual Function Index.

Results The obesity prevalence of pregnant women was 36.6% in this study. This study found that maternal obesity was a predictive factor on pregnancy symptoms ($p < 0.05$). However, no difference was found between FSFI scores according to pregnancy symptoms in obese and non-obese pregnant women ($p > 0.05$).

Conclusions Quality pre-conceptional midwifery care and consultancy accompanied by regular pregnancy follow-ups are considered to prevent the development of maternal obesity, pregnancy complaints, and sexual dysfunction and be a fundamental step that can improve maternal health.

Keywords Obesity, Pregnancy, Sexuality, Pregnancy symptoms

Introduction

Obesity is a medical problem that includes genetic, nutritional, and environmental factors in its etiology and is defined as abnormal and excessive fat accumulation in the body [1, 2]. According to the World Health Organization (WHO), obesity is a worldwide epidemic and the greatest public health issue of the 21st century. With the changes in socio-economic conditions and nutrition habits, the prevalence of obesity demonstrates a serious increase, particularly in developed countries (WHO, 2022). With the increase in its prevalence, obesity has been more common in women at reproductive age and young people and has become an important risk factor

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during pregnancy [2, 3]. The WHO estimates that by the year 2025, approximately 167 million people (adults and children) will be overweight or obese, and 20% of them will be women [2, 4]. As for Türkiye, according to the Türkiye Demographic and Health Survey (TDHS) report in 2018, 30% of women aged between 15 and 49 were obese. Besides, according to the Türkiye Statistical Institute data in 2020, 24.8% of women were obese [5, 6].

The obesity problem is known to have negative effects on the health of all individuals, particularly women at reproductive ages. Pregnancy is one of the periods when women of reproductive age have a high risk of weight gain [7]. Existing obesity conditions or high weight increases during pregnancy cause serious problems in the mother and the newborn during the pregnancy, birth, and postpartum periods [8].

Obesity negatively affects pregnancy symptoms and sexual life as well as obstetric outcomes. The literature reports that obesity may directly or indirectly affect sexual function. Obesity has physiologic effects such as hormonal imbalances, changes in vascular structure, or disorders in neural transmission. It may cause sexual reluctance with psychological effects that negatively affect body perception and self-esteem [9]. However, since pregnancy itself involves physical and psychological changes, it is also possible that changes in pregnancy mask the possible effects of obesity. Maternal obesity is reported to cause carbohydrate metabolism and insulin secretion, leading to an increase in pregnancy symptoms such as fatigue and backache. Increased pregnancy symptoms limit daily life activities [9].

Physiological, psychological, and sociocultural factors affect sexuality during pregnancy. In the first trimester, the number of sexual intercourse and sexual desire may decrease due to the physiological changes experienced during pregnancy. In the second trimester, sexual desire may increase as physical changes are adopted. In the third trimester, sexual desire may decrease, especially with the effect of the growing uterus and other physical complaints. Therefore, pregnancy is a period that has the potential to negatively affect sexual life in relation to physiological, psychological, and sociocultural factors [10]. However, the literature includes a limited number of studies on the effects of maternal obesity on pregnancy symptoms, daily life, and sexual life [11]. The literature reports that being overweight could increase sexual problems by causing negative body image during pregnancy, and women with excessive weight are reported to have lower sexual functions in comparison to women with normal weight [1, 11]. Despite this, the literature includes limited data on the effect of obesity on sexual functions in pregnant women [1, 11].

When the increased obesity prevalence in the world and our country is taken into consideration, it is highly important to assess women in a holistic approach and improve the care provided to pregnant women in this period. This care should be performed under the leadership of midwives and nurses. Studies on obesity during pregnancy were found to focus on the maternal and fetal outcomes of obesity mainly, and there is a limited number of studies on pregnancy symptoms and sexuality during pregnancy [11, 12]. Cultural characteristics of Turkish society may normalize weight gain during pregnancy [13]. In addition, the fact that sexuality in pregnancy is considered taboo and is not wanted to be discussed may be a factor in the limited number of studies on this subject. For these reasons, studies on the subject remain limited [14]. Hence, this study is of importance in terms of assessing pregnancy symptoms and sexual functions during pregnancy in tandem.

Methods

Purpose of the study

The purpose of this study was to investigate the predictive factors of maternal obesity and its impact on pregnancy symptoms and sexual function in pregnant women living in the Eastern Mediterranean region of southern Türkiye.

Research questions

1) what are the factors predicting maternal obesity?

2) does maternal obesity affect pregnancy symptoms?

3) do existing pregnancy symptoms affect sexual functions?

Target population and sample

The target population of the study was pregnant women who sought treatment in 3 hospitals in Adana, Mersin, and Hatay cities, located in southern Türkiye, between June and August 2021.

Obesity prevalence in pregnancy (50%) reported in the study conducted by Cochrane et al. (2019) was taken as the reference, and the Sample Size Calculator website was utilized for calculating the sample size [3]. The minimum sample size to be reached was calculated as 588 in a 5000-target population, 5% margin of error ($\alpha = 0.05$), and 99% power ($1\text{-}\beta = 0.99$). Considering potential losses, the sample size was increased by 10%, and the study was conducted with 647 pregnant women. The study group was chosen from the Adana ($n = 331$), Mersin ($n = 113$), and Hatay ($n = 203$) provinces. The inclusion criteria were agreeing to participate in the study voluntarily, speaking Turkish, being literate, being >18, having a gestational age of >20 weeks, and being sexually active within the past one month. Pregnant women who experienced ablatio placentae, placenta previa, abortus threat, pre-term

labor risk, premature rupture of membrane, and multiple pregnancies were excluded.

Research design

This study utilized a cross-sectional, hospital-based, and multi-center design. Body Mass Index was calculated according to women's pre-pregnancy weight to determine the obesity prevalence during pregnancy. Body Mass Index (BMI) was categorized according to the CDC (2021) classification [4].

- **underweight: BMI < 18,5**
- **normal weight: 18,5 < BMI < 25**
- ***overweight (Pre-obese): 25 < BMI < 30***
- **obesity: BMI ≥ 30 Data collection**

Data were collected by meeting the participants face-to-face. The pregnant women who came to the health institution were taken to a separate room and administered the data collection tools. Filling in the questionnaires took about 15 min. Data were collected through the Socio-demographic Form developed by the researchers in line with the literature, the Pregnancy Symptoms Inventory, and the Female Sexual Function Index.

Socio-demographic form

The Socio-demographic Form is composed of 21 questions that included 11 questions about the socio-demographic characteristics and 10 questions about overall health and obstetric features [12, 15, 16].

Pregnancy symptoms inventory (PSI)

Pregnancy Symptoms Inventory was developed by Foxcroft et al. in Australia in 2008 to be used by health professionals to detect the presence and frequency of pregnancy symptoms and how each of these symptoms affects daily life [17]. The reliability and validity of the scale were performed by Özorhan and Pasinlioglu [18]. The scale includes 42 items and two parts. The first part assesses the frequency of the pregnancy symptoms that emerged within the past one month, and this part is rated on a 4-point Scale including the options of "never" (0), "rarely" (1), "sometimes" (2), and "often" (3). The second part of the scale is the response if the respondent marks 1–3 for each symptom in the first part. The second part is a 3-point Likert scale that measures how symptoms affect daily life activities, and the options include "not limited at all (0)", "limited a little (1)", and "limited a lot (2)". The scale has no cut-off point. The activity of daily living negatively affects the increase in the total score. Cronbach's alpha reliability coefficient of the scale is 0.91 [18]. This study found Cronbach's alpha reliability coefficient as 0.86.

The female sexual function index-FSFI

The FSFI is a 19-item, multi-dimensional scale that is easily applied; it is a self-report and short scale that is utilized to assess sexual functions in women. The scale developed by Rosen et al. (2000) includes a total score as well as the scores of six dimensions that form the sexual functions. The scale assesses desire (1,2), arousal (3, 4, 5, 6), lubrication (7, 8, 9, 10), orgasm (11, 12, 13), satisfaction (14, 15, 16), and pain (17, 18, 19) as the six dimensions of the sexual functions. Items assessing each sexual function on the scale are scored between 0 and 5. Higher scores indicate better sexual functions. "0" indicates that the respondent had no sexual intercourse within the past one month. The score belonging to each of the six dimensions is calculated by summing the responses given to that dimension and calculating the factor score of that dimension. The total scale score is obtained by summing the score of each dimension. Higher scores indicate better sexual functions [19]. Turkish reliability and validity of the scale were performed by Aygin et al. (2005). Wiegel et al. (2005) determined the FSFI cut-off point to determine the female sexual dysfunction as 26.55. Total scores to be obtained from the scale range between 2 and 36 [19, 20].

Data analysis

Data were analyzed in the IBM SPSS Statistics 22.0 program. Shapiro-Wilk test was performed to find out if the data showed normal distribution, indicating a non-parametric distribution of the data. The participants were categorized into two groups: normal weight (BMI < 25) and pre-obesity/obesity (BMI ≥ 25), and univariate and multivariate analyses were performed. Chi-square (χ^2) test was performed to compare the descriptive and obstetric characteristics according to obesity condition; Mann-Whitney U test was performed to analyze the distribution of scale scores according to obesity condition; and Spearman Correlation was performed to analyze the correlation of the scale scores. In multivariate analysis, Logistic Regression was performed to determine the predictor factors affecting obesity. Statistical significance was accepted as ≤ 0.05 in the analyses.

Results

The average age of the participants was 27.79 ± 6.05. This study found the prevalence of pre-obesity/obesity to be 36.6% in pregnant women who lived in the Mediterranean region in southern Türkiye. Table 1 demonstrates the descriptive and obstetric characteristics of participating pregnant women. Predictor factors for the obesity problem were determined as advanced age, low education level, the city where individuals lived, and the presence of a known disease (diabetes mellitus, hypertension, thyroid diseases, etc.) ($p < 0.05$). Advanced age causes a

Table 1 Descriptive and obstetric characteristics of pregnant women according to obesity status ($n=647$)

	Obesity (-) *n* (%)	Obesity (+) *n* (%)	χ^2	*p*
Age group	260 (63.4)	110 (46.4)	17.730	< 0.001
< 27 years	150 (36.6)	127 (53.6)		
≥ 27 years				
Educational status	108 (26.3)	95 (40.1)	21.458	< 0.001
Primary school	68 (16.6)	51 (21.5)		
Middle School	110 (26.8)	43 (18.1)		
High school	124 (30.2)	48 (20.3)		
University and above				
Working status	105 (25.6)	41 (17.3)	5.936	**0.015**
Working	305 (74.4)	196 (82.7)		
Not working				
Social security	99 (24.1)	59 (26.2)	0.326	0.572
Yes	311 (75.9)	175 (73.8)		
No				
Family type	333 (81.2)	182 (76.8)	1.812	0.189
Nuclear	77 (18.8)	55 (23.2)		
Extended				
İncome level	172 (42)	73 (30.8)	7.950	**0.011**
Good	197 (48)	135 (57)		
Middle	41 (10)	29 (12.2)		
Poor				
Living city	188 (45.9)	143 (60.3)	21.714	**< 0.001**
Adana	155 (37.8)	48 (20.3)		
Hatay	67 (16.3)	46 (19.4)		
Mersin				
Addictive habits	351 (85.6)	222 (93.7)	9.635	**0.002**
No	59 (14.4)	15 (6.3)		
Yes				
Exercise status	182 (44.4)	115 (48.5)	1.522	0.559
Never	136 (33.2)	68 (28.7)		
1–2 times a week	92 (22.4)	54 (22.8)		
3 times a week or more				
Marital relationship	297 (72.4)	149 (62.9)	6.426	**0.015**
Good	103 (25.1)	80 (33.8)		
Middle	10 (2.4)	8 (3.4)		
Poor				
The presence of a known disease	356 (86.8)	171 (72.2)	21.416	**< 0.001**
	54 (13.2)	66 (27.8)		
No				
Yes				
Parity	155 (37.8)	52 (21.9)	17.371	**< 0.001**
Primipar	255 (62.2)	185 (78.1)		
Multipar				
Pregnancy planning status	298 (72.7)	147 (62)	7.944	**0.006**
	112 (27.3)	90 (38)		
Planned				
Unplanned				
Pregnant education	245 (59.8)	132 (55.7)	1.018	0.322
No	165 (40.2)	105 (44.3)		
Yes				

Ki-kare test

two-times increase in the obesity problem (OR = 2.145, $p<0.001$) (Table 2). PSI first part (symptoms) mean score of women with obesity problem was found 41.00 ± 19.35; the second part (effects of symptoms on the activities of daily living) mean score was found 22.60 ± 11.63; and the FSFI mean score was found 17.93 ± 7.53. Compared to pregnant women with normal weight, pregnant women with obesity problems demonstrated a significant difference in terms of PSI first and second part mean scores ($p<0.05$). However, there is no difference between the FSFI scores according to the obesity status (Table 3).

It is significantly more common in obese pregnant women to symptoms that hemorrhoids, sleep problems, snoring, restless legs syndrome, urinary frequency, leaking urine, fungus, changes in libido, painful veins in the vagina, carpal tunnel syndrome, sore nipples, fainting, forgetfulness, anxiety, varicose veins, stretch marks, brownish marks on the face, acne (Table 4). However, there is no difference between FSFI scores according to pregnancy symptoms in obese and non-obese pregnant women (Table 5).

Discussion

The results of this hospital-based study conducted in three cities located in southern Türkiye found that the participants' obesity prevalence was above the expected values. Obesity was found to have negative effects on the participants' pregnancy symptoms, but no differences were found between the sexual functions.

Maternal obesity, with its increasing prevalence today, is known to cause serious problems in the mother and the newborn. On the other hand, obesity is becoming an important global health problem with negative effects on pregnant women's daily lives. The literature includes a limited number of studies that assessed the effects of maternal obesity on more than one area in tandem [12]. The present study is thus believed to be important and valuable as it is the first study that determines the prevalence of maternal obesity as well as the effects of maternal obesity on pregnancy symptoms and the activities of daily living and sexual functions.

According to the CDC (2021) classification, 36.6% of participating women in this study were in the pre-obesity/obesity category. International and national studies report the obesity prevalence during pregnancy between 8.4% and 57% [11, 12, 21, 22]. The results of this study are in line with the finding indicating that obesity tends to increase over the years. There are some lifestyle, physiological, psychological, environmental, genetic factors, and cultural factors, that play a role in the development of maternal obesity. Weight gain during pregnancy varies in different societies and cultures. Differences in lifestyle, nutrition, culture, beliefs and attitudes lead to differences in behaviors and perceptions regarding weight gain and obesity during pregnancy [23–25]. Food taboos could be associated with weight gain behaviors. Food taboos during pregnancy could lead to specific biological pressures on a cross-cultural scale and are reflected in pregnant

Table 2 Predictive factors affecting obesity status (*n* = 647)

Obesity (-/+)							%95 CI	
	B	S.E.	Wald	df	*p*	OR	Lower	Upper
Age group < 27 years ≥ 27 years	0.763	0.180	17.974	1	< 0.001	2.145	1.507	3.052
Educational status	-0.41	0.258	0.025	1	0.874	0.960	0.579	1.591
Primary school	-0.721	0.261	7.646	1	**0.006**	0.486	0.292	0.811
Middle School	-0.761	0.260	8.548	1	**0.003**	0.467	0.281	0.778
High school University and above								
Living city	-1.053	0.286	13.539	1	**< 0.001**	0.349	0.199	0.611
Adana	-0.264	0.305	0.748	1	0.387	0.768	0.423	1.396
Hatay Mersin								
Addictive habits No Yes	-1.095	0.321	11.610	1	**0.001**	0.335	0.178	0.628
The presence of a known disease No Yes	-0.790	0.223	12.573	1	**< 0.001**	0.454	0.293	0.702

Logistic Regresion

Table 3 Distribution of scale scores according to obesity status (*n* = 647)

	Obesity (-) (*n* = 410)	Obesity (+) (*n* = 237)	Z	*p*
	χ ± SD (median, min-max)	χ ± SD (median, min-max)		
PSI_1	34.68 ± 21.35 (34, 3–99)	41.00 ± 19.35 (42, 5–89)	-3.776	**< 0.001**
PSI_2	19.00 ± 12.38 (17, 0–61)	22.60 ± 11.63 (23, 1–73)	-4.092	**< 0.001**
FSFI	17.81 ± 6.42 (19, 2–32)	17.93 ± 7.53 (20, 2–32)	-1.222	0.222
Desire	2.53 ± 1.13 (2,	2.57 ± 1.17 (2,	-0.341	0.733
Arousal	1.2-6)	1.2–5.4)	-0.109	0.913
Lubrication	2.71 ± 1.53 (2, 0–6)	2.71 ± 1.76 (2, 0–6)	-0.813	0.416
Orgasm	4.28 ± 1.79 (4, 0–8)	4.19 ± 2.10 (4,	-0.766	0.444
Satisfaction	3.01 ± 1.28 (3, 0–6)	0-7.2)	-0.321	0.748
Pain	2.12 ± 1.05 (1,	2.95 ± 1.51 (3, 0–6)	-0.731	0.465
	0.8–5.2)	2.13 ± 1.06 (1,		
	3.13 ± 2.40 (3,	0.8-6)		
	0-6.4)	3.32 ± 2.25 (3, 0–6)		

Mann-Whitney U Test

women's weight gain behaviors [26]. A systematic review of factors affecting pregnancy and postpartum weight management in women of African and Caribbean descent reported that in process from pre-pregnancy to the postpartum period, women of Black African descent were more likely to be overweight or obese than white women [25]. There is a limited number of qualitative studies that examined the attitudes, beliefs and behaviors related to weight gain during pregnancy [28–30]. Studies conducted showed that women had negative attitudes towards excessive weight gain during pregnancy and took their spouses, relatives and health professionals as reference for weight gain during pregnancy [27–31]. Many societies have the widespread belief that pregnant women should gain weight. Pregnant women are expected to take a break from dieting and weight control during pregnancy and people in society are expected to avoid negative comments about pregnant women's body image [25]. In Türkiye, there is a limited number of studies that examined the attitudes, beliefs and behaviors related to weight gain during pregnancy [32–33]. This study determined the important predictor factors triggering the maternal obesity problem as advanced age, low education level, the city where individuals lived, addictive habits, and the presence of a known disease. Particularly, the increase in maternal age causes a two-time increase in maternal obesity. The CDC report indicates that obesity rates increased with the increase in the age of women who had pre-pregnancy obesity in America between 2016 and 2019. The obesity rates increased from 27.2% in 2016 to 30.4% in 2019 in women aged 20–29, from 25.8 to 28.3% in women aged 30–39, and from 28 to 30.4% in women aged 40 and above [4]. A study conducted with 9159 women with post-term labor in France reported advanced age as one of the factors that increase the obesity problem [22]. Doğan et al. (2018) reported that the obesity prevalence of obesity increased with the increase in age [11]. Conversely, the study conducted with 9064 women in Romania by Panaitescu et al. (2019) investigated the distribution of women's body mass index and its relationship with pregnancy outcomes and found that the relationship between the pregnancy age and the body mass index was not significant [34].

In this study, low education level was determined as a predictor factor in the development of maternal obesity. CDC reports that every year from 2016 to 2019, women

Table 4 Pregnancy symptoms according to obesity status ($n=647$)

	Obesity (-) *n* (%)	Obesity (+) *n* (%)	X^2	*P*
General				
Tiredness/Fatigue (-)	62 (15.1)	35 (14.8)	0.015	> 0.999
Tiredness/Fatigue (+)	348 (84.9)	202 (82.2)		
Gastrointestinal				
Nausea (-)	205 (50)	205 (44.7)	1.674	0.221
Nausea (+)	106 (50)	131 (55.3)		
Vomiting (-)	240 (58.5)	155 (65.4)	2.976	0.094
Vomiting (+)	170 (41.5)	82 (34.6)		
Reflux (-)	240 (58.5)	123 (51.9)	2.687	0.118
Reflux (+)	170 (41.5)	114 (48.1)		
Hemorrhoids (-)	241 (58.8)	106 (53.6)	11.930	**0.001**
Hemorrhoids (+)	169 (41.2)	131 (55.3)		
Constipation (-)	339 (82.7)	182 (76.8)	3.322	0.080
Constipation (+)	71(17.3)	55 (23.2)		
Dry mouth (-)	201 (49)	123 (51.9)	0.496	0.514
Dry mouth (+)	209 (51)	114 (48.1)		
Craving (-)	256 (62.4)	143 (60.3)	0.281	0.615
Craving (+)	154 (37.6)	94 (39.7)		
Taste/smell changes (-)	102 (24.9)	70 (29.5)	1.669	0.198
Taste/smell changes (+)	308 (75.1)	167 (70.5)		
Sleep				
Sleep problem (-)	166 (40.5)	70 (36.5)	7.774	**0.005**
Sleep problem (+)	244 (59.5)	167 (63.5)		
Snoring (-)	153 (37.3)	57 (24.1)	12.057	**< 0.001**
Sonoring(+)	257 (62.7)	180 (75.9)		
Restless legs (-)	358 (87.3)	178 (82.8)	15.758	**< 0.001**
Restless legs (+)	52 (12.7)	111 (17.2)		
Genitourinary				
Urinary frequency (-)	131 (32)	48 (20.3)	10.270	**0.001**
Urinary frequency (+)	279 (68)	189 (79.7)		
Leaking urine (-)	241 (58.8)	113 (47.7)	7.470	**0.007**
Leaking urine (+)	169 (41.2)	124 (52.3)		
Increased vaginal discharge (-)	253 (61.7)	131 (55.3)	2.576	0.115
Increased vaginal discharge (+)	157 (38.3)	106 (44.7)		
Thrush / fungus (-)	238 (58)	102 (43)	13.571	**< 0.001**
Thrush / fungus (+)	172 (42)	135 (57)		
Changes in libido (sexual desire) (-)	155 (37.8)	67 (28.3)	6.058	**0.016**
Changes in libido (sexual desire) (+)	255 (62.2)	170 (71.7)		
Painful veins in vagina (-)	344 (83.9)	168 (70.9)	15.410	**< 0.001**
Painful veins in vagina (+)	66 (16.1)	69 (29.1)		
Pain				
Carpal tunnel (numb hand) (-)	273 (66.6)	127 (53.6)	10.752	**0.001**
Carpal tunnel (numb hand) (+)	137 (33.4)	110 (46.4)		
Sciatica/pain down the back of your legs (-)	188 (45.9)	111 (46.8)	0.058	0.870
Sciatica/pain down the back of your legs (+)	222 (54.1)	126 (53.2)		
Upper back / lower back pain (-)	164 (40)	97 (40.9)	0.054	0.868
Upper back / lower back pain (+)	246 (60)	140 (59.1)		
Hip or pelvic pain (-)	271 (66.1)	146 (61.6)	1.324	0.268
Hip or pelvic pain (+)	139 (33.9)	91 (38.4)		
Breast pain (-)	83 (20.2)	44 (18.6)	0.268	0.681
Breast pain (+)	327 (70.8)	193 (81.4)		
Headache (-)	271 (66.1)	140 (59.1)	3.199	0.0
Headache (+)	139 (33.9)	97 (40.9)		76
Sore nipples (-)	103 (25.1)	44 (18.6)	3.677	**0.033**
Sore nipples (+)	307 (74.9)	193 (81.4)		

Table 4 (continued)

	Obesity (-) *n* (%)	Obesity (+) *n* (%)	X^2	*P*
Leg Cramps (-)	293 (71.5)	159 (67.1)	1.365	0.249
Leg Cramps (+)	117 (28.5)	78 (32.9)		
Cardiovascular				
Dizziness (-)	360 (87.8)	197 (83.1)	2.750	0.100
Dizziness (+)	50 (12.2)	40 (16.9)		
Fainting (-)	302 (73.7)	154 (65)	5.438	**0.025**
Fainting (+)	108 (26.3)	83 (35)		
Heart palpitations (-)	322 (78.5)	188 (79.3)	0.056	0.448
Heart palpitations (+)	88 (21.5)	49 (20.7)		
Shortness of breath (-)	191 (46.6)	127 (53.6)	2.945	0.087
Shortness of breath (+)	219 (53.4)	110 (46.4)		
Swollen hands or feet (-)	259 (63.2)	136 (57.4)	2.115	0.155
Swollen hands or feet (+)	151 (36.8)	101 (42.6)		
Mental				
Forgetfulness (-)	236 (57.6)	111 (46.8)	6.947	**0.009**
Forgetfulness (+)	174 (42.4)	126 (53.2)		
Feeling depressed (-)	257 (62.7)	143 (60.3)	0.350	0.558
Feeling depressed (+)	153 (37.3)	94 (90.5)		
Anxiety (-)	227 (55.4)	104 (43.9)	7.927	**0.006**
Anxiety (+)	183 (44.6)	133 (56.1)		
Vivid dreams (-)	310 (75.6)	177 (74.7)	0.069	0.850
Vivid dreams (+)	100 (24.4)	60 (25.3)		
Altered body ımage/change in body image or function satisfaction) (-)	383 (93.4)	228 (96.2)	2.222	0.157
Altered body ımage/change in body image or function satisfaction) (+)	27 (6.6)	9 (3.8)		
Skin				
Greasy skin/acne (-)	270 (65.9)	138 (58.2)	3.749	**0.032**
Greasy skin/acne (+)	140 (34.1)	99 (41.8)		
Varicose veins (-)	195 (47.6)	93 (39.2)	4.210	**0.041**
Varicose veins (+)	215 (52.4)	144 (60.8)		
Brownish marks on face (-)	256 (62.4)	121 (51.1)	8.005	**0.005**
Brownish marks on face (+)	154 (37.6)	116 (48.9)		
Itchy skin (-)	199 (48.5)	88 (37.1)	7.916	**0.005**
Itchy skin (+)	211 (51.5)	149 (62.9)		
Changes in nipples (-)	141 (34.4)	90 (38)	0.841	0.395
Changes in nipples (+)	269 (65.6)	147 (62)		
Stretch marks (-)	201 (49)	76 (32.1)	17.638	**<0.001**
Stretch marks (+)	209 (51)	161 (67.9)		

with an education level of below undergraduate degree had a higher risk of having pre-pregnancy obesity in comparison to women with an undergraduate or post-graduate degree [20]. A study conducted by González-Plaza et al. (2021) with 5447 pregnant women (≥23 weeks) in Spain found that the obesity prevalence was higher in those who had a low education level [21].

In this study, other predictor factors for the development of maternal obesity included the city where individuals lived, addictive habits, and the presence of a known disease. A descriptive study conducted by Dogan et al. (2018) with 400 pregnant women reported that the disease history of individuals was a risk factor that increased their obesity condition [11]. In a similar vein, other studies in the literature also reported that the presence of a known disease and the place of living increased the prevalence of obesity [35].

Maternal obesity is generally considered an important health problem in terms of increasing negative maternal, perinatal, and neonatal outcomes. However, the obesity problem, which decreases daily life activities and brings along social and psychological effects, could affect women's quality of daily life and sexual functions directly. This study found that in comparison to women with normal weight, women with obesity problems had more pregnancy symptoms and more negative effects on the activities of daily living. In addition, pregnancy complaints also vary according to obesity and affect women's quality of life. In this study, it was determined that obese pregnant women were seen more frequently with symptoms including hemorrhoids, sleep problems, snoring, restless

Table 5 FSFI scores according to existing pregnancy symptoms ($n=647$)

	Obesity (-) χ ± SD	Obesity (+) χ ± SD	t	*P*
General				
Tiredness/Fatigue	18.22 ± 7.58	18.17 ± 7.58	0.086	0.932
Gastrointestinal				
Nausea	17.47 ± 6.39	16.31 ± 8.14	1.388	0.167
Vomiting	18.61 ± 5.82	18.64 ± 7.62	-0.036	0.972
Reflux	16.96 ± 6.33	15.39 ± 8.19	-2.745	**0.006**
Hemorrhoids	18.17 ± 6.79	17.44 ± 8.26	-0.817	0.414
Constipation	17.36 ± 6.98	17.70 ± 8.78	-0.235	0.815
Dry mouth	18.15 ± 5.82	17.66 ± 8.20	0.563	0.574
Craving	18.54 ± 6.24	17.71 ± 8.11	0.849	0.397
Taste/smell changes	17.28 ± 6.65	17.50 ± 7.83	0.008	0.764
Sleep				
Sleep problem	18.04 ± 6.66	17.65 ± 7.89	0.516	0.606
Snoring	18.09 ± 6.60	17.96 ± 7.61	0.188	0.851
Restless legs	16.75 ± 6.98	14.60 ± 8.74	1.444	0.152
Genitourinary				
Urinary frequency	18.43 ± 6.62	18.31 ± 7.56	0.176	0.860
Leaking urine	17.05 ± 7.06	15.77 ± 8.41	1.378	0.170
Increased vaginal discharge	16.52 ± 7.11	15.47 ± 8.41	1.052	0.294
Thrush / fungus	16.66 ± 7.59	17.28 ± 8.27	-0.671	0.503
Changes in libido (sexual desire)	18.26 ± 6.61	17.40 ± 7.87	1.170	0.243
Painful veins in vagina	15.24 ± 7.66	15.16 ± 8.26	0.060	0.953
Pain				
Carpal tunnel (numb hand)	18.33 ± 7.05	18.39 ± 7.70	-0.064	0.949
Sciatica/pain down the back of your legs	17.85 ± 6.31	17.84 ± 7.67	0.009	0.992
Upper back / lower back pain	18.11 ± 6.57	17.06 ± 8.29	1.278	0.202
Hip or pelvic pain	18.04 ± 6.88	19.47 ± 7.32	-1.486	0.139
Breast pain	17.44 ± 6.49	17.89 ± 7.70	-0.680	0.497
Headache	18.31 ± 6.76	17.65 ± 7.73	0.678	0.499
Sore nipples	17.72 ± 6.61	17.58 ± 7.80	0.211	0.833
Leg Cramps	18.16 ± 6.99	16.60 ± 8.23	1.370	0.173
Cardiovascular				
Dizziness	14.52 ± 6.48	11.44 ± 8.09	1.957	0.054
Fainting	17.87 ± 7.15	16.45 ± 8.19	1.258	0.210
Heart palpitations	18.24 ± 6.71	16.08 ± 8.30	1.560	0.123
Shortness of breath	17.21 ± 6.53	16.91 ± 7.33	0.367	0.714
Swollen hands or feet	19.78 ± 5.91	19.51 ± 7.44	0.303	0.763
Mental				
Forgetfulness	17.87 ± 7.10	17.63 ± 8.52	0.256	0.798
Feeling depressed	19.56 ± 5.75	19.20 ± 6.99	0.422	0.674
Anxiety	17.93 ± 7.34	17.49 ± 8.19	0.500	0.618
Vivid dreams	19.85 ± 5.61	20.21 ± 6.31	-0.367	0.715
Altered body ımage/change in body image or function satisfaction)	17.44 ± 7.94	19.87 ± 2.163	-1.442	0.159
Skin				
Greasy skin/acne	17.40 ± 6.82	15.67 ± 8.59	1.665	0.098
Varicose veins	18.25 ± 7.11	17.24 ± 8.04	1.220	0.224
Brownish marks on face	17.20 ± 7.11	16.17 ± 8.18	1.076	0.283
Itchy skin	17.61 ± 6.95	16.86 ± 8.17	0.909	0.364
Changes in nipples	16.61 ± 6.89	16.58 ± 8.01	0.043	0.966
Stretch marks	17.42 ± 7.05	17.15 ± 7.99	0.342	0.733

legs syndrome, frequent urination, urinary incontinence, fungus, libido changes, painful veins in the vagina, carpal tunnel syndrome, pain in the nipples, fainting, forgetfulness, anxiety, varicose veins, cracks, marks, acne. There is a limited number of studies examining pregnancy symptoms according to obesity status in the literature [35, 36]. Lee et al. (2014) state that obese individuals have a higher risk of experiencing hemorrhoidal problems [37]. However, no studies were found have examined the condition of experiencing hemorrhoids in obese pregnant women. In this study, it was determined that hemorrhoids were seen more frequently in obese pregnant women than in non-obese pregnant women. Tuna et al. (2022) reported that 79% of obese individuals had poor sleep quality. Sleep problems such as insomnia, snoring, and restless legs syndrome are frequently seen in obese individuals [38]. Silvestri et al. (2019) reported the existence of sleep problems during pregnancy [36]. Similar to the literature, in this study it was determined that obese pregnant women had more sleep problems than those who were not. Otelea et al. (2022) examined the relationship between carpal tunnel syndrome and abnormal fat distribution and reported that abnormal accumulation and function of adipose tissue may cause the formation of carpal tunnel syndrome [39]. In another study, it was reported that the incidence of carpal tunnel syndrome in pregnant women ranged from 2.3 to 62% [40]. In this study, the incidence of carpal tunnel was higher in obese pregnant women. In another study conducted by Nagl et al. (2015) it was reported that anxiety increased with obesity [41]. In a study, anxiety rates in the 1st, 2nd, and 3rd trimesters of pregnancy were reported 8.6%, 10%, and 12.6% in normal-weight women, respectively, while it was 17.9%, 19.2%, and 12.5% in obese women [42]. Similar results were obtained in this study as well. There are many skin changes with the effect of physiological changes in pregnancy, which may include redness, acne, lubrication, etc. Hirt et al. (2019) examined obesity and skin changes and reported that there were skin changes in obese individuals [43]. Similar to the literature, it was determined that skin changes were more common in obese pregnant women in this study. Therefore, it is possible to state that pregnancy complaints are more common in obese pregnant women.

Sexual function is another issue that is considered to be associated with maternal obesity [1]. In this study, no difference was found between FSFI scores in obese and non-obese pregnant women. FSFI total scores of pregnant women in both groups were below the cut off value of 26.55, and sexual function of pregnant women was reported to be low regardless of obesity. When the participants were evaluated according to pregnancy complaints, the complaints of change in libido, hemorrhoids, sleep problems, snoring, urinary frequency, leaking urine, painful veins in vagina and anxiety were found to be more common in obese pregnant women. The study findings suggest that pregnant women's sexual function may be driven by factors other than BMI and body image, such as physiological and psychological changes. In this study, there is no difference between FSFI scores according to pregnancy symptoms in obese and non-obese pregnant women. The study conducted by Senobari et al. (2019) found no relationship between the increase in the body mass index and sexual functions during pregnancy [1]. Another study in the literature is different from the results in this study and show that the increase in the body mass index affect sexual function during pregnancy. The study in the literature reported that women with excessive weight in the third trimester had poorer sexual functions in comparison to women with normal weight [9]. Cultural factors and taboos are important phenomena that have the potential to negatively affect sexuality during pregnancy. Sexual attitudes and behaviors are influenced by the environment in which individuals grow up and live, social value judgments, lifestyle, traditions, religious beliefs, culture and moral attitudes, gender roles, social status, etc. Sexual intercourse is considered taboo, sexuality is interrupted, and sexual function is impaired. Couples' sexuality is reported to be interrupted during pregnancy due to concerns about the risk of harm to the fetus and pregnancy, abortion, infection, premature rupture of membranes, preterm labor, etc. Sexuality is taboo to talk about, especially in Muslim countries, and it is prohibited as a solution to any problem related to pregnancy. Beliefs and taboos about sexuality could increase in cases when there is a lack of adequate sexuality counseling. However, cultural factors and beliefs constitute one of the biggest barriers for couples to receive this care and counseling [44, 45]. In Turkish culture, sexuality during pregnancy is a neglected issue. Lack of information related to sexuality during pregnancy, fallacies approved by society about restrictions on sexual relationships in this period, and seeing sexuality as a taboo are common in the traditional views of Turkish society [45, 46]. In their study conducted in Türkiye, Gökyıldız Sürücü et al. (2022) reported very high levels of sexual dysfunction during pregnancy [46]. Another study conducted in Türkiye reported that the frequency of sexual intercourse decreased at a ratio of 83.2% during pregnancy, 71.9% of pregnant women did not find sexuality safe during pregnancy, and 58.7% were afraid of sexual relationships during pregnancy [16]. Although the present study did not assess participants' beliefs and attitudes about sexuality during pregnancy, low sexual functions of obese and non-obese women are considered to reflect the beliefs of Turkish society about sexuality during pregnancy. Maternal obesity was found to have no direct effects on sexual functions during pregnancy, which is

considered to be affected by the pregnancy and sexual life characteristics of Turkish society indicated above.

Conclusion

This study found the prevalence of maternal obesity to be 36.6% in the eastern Mediterranean region. Advanced age, low education level, the city where individuals lived, addictive habits, and the presence of a known disease were indicated as factors that affected maternal obesity. In addition, maternal obesity was found to have negative effects on pregnancy symptoms and the activities of daily living. However, it has been observed that it has no direct effect on sexual functions during pregnancy, and complaints about sexual functions during pregnancy are more common in obese pregnant women. The main reason for the lack of sexual functions is considered to be the decrease in sexual functions during pregnancy and the negative attitudes of Turkish culture about sexual intercourse during pregnancy. The problems experienced in the sexual relationship are not noticed by women or talking about these problems is not considered right. Therefore, Turkish women avoid detailed explanations and state that they have a normal sexual life. Besides their medical and obstetric history, it is important to make a detailed assessment of women's social, cultural, and psycholocigal characteristics. Raising awareness is the most important step in the solution to these problems, which may vary from culture to culture.

The pre-conceptional period is considered to be the most suitable period for this. Beginning from the preconception period, midwives and nurses have a key role in the holistic assessment of pregnant women. Quality pre-conceptional midwifery care and consultancy accompanied by regular pregnancy follow-ups are considered to prevent the development of these problems (maternal obesity, pregnancy complaints, sexual dysfunction, etc.) and be a fundamental step that can improve maternal health. In addition, these findings, which can be taken into consideration while formulating health policies related to obesity, are belived to contribute to the improvement of maternal and child health as primary and public health as a secondary. Finally, qualitative studies to evaluate the relationship between obesity and sexual function in more detail and take into account the effect of cultural factors could be recommended.

Strengths and limitations of the study

This study has some strengths and limitations. The most important strength is that it was conducted in a specific region to determine the predictive factors of maternal obesity and its impact on pregnancy symptoms and sexual functions. While the national literature includes no studies on the issue, the studies in the international literature are quite limited in number. In this regard, the study is believed to provide an important contribution to the literature. Secondly, it has a sufficient and strong sample size, which enabled data saturation. However, there are also some limitations of this study. The sample represents a single region, and the study is hospital-based, which limits the generalizability of the results. Conducting society-based and qualitative studies on the issue could contribute to obtaining more detailed and reliable data on this issue. In addition to quantitative studies, qualitative studies to be conducted in the future could contribute to the analysis of cultural values regarding sexuality during pregnancy and help to meet the needs of pregnant women/couples. Due to the limitations of the cross-sectional design, the study did not focus on the causes of obesity in depth, and causality relationships could not be established. Only the relationship between obesity and demographic and disease history was examined. Finally, in this study, pregnant women were included from the second trimester. The course of sexuality could not be evaluated in all stages of pregnancy, which is another limitation of our study.

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Author contributions
EG, SGS, and BAV designed and developed the proposal. AC, EAA, COK and AT per formed the data collection and entry. AC and EG performed the statistical analysis. EG, SGS, and BAV drafted the initial manuscript. All the authors contributed to reviewing and revising the manuscript. The final manuscript was read and approved by all the authors.

Data availability
No datasets were generated or analysed during the current study.

Declarations

Ethical approval
This study was approved (number: 2021.05.21/111; date: May 21, 2021) by the Non-invasive Clinical Studies Ethics Committee at the Medical Faculty of Çukurova University. Informed consent was received from all the participants before the data collection process. The study followed the principles of the Declaration of Helsinki.

Consent for publication
Not applicable.

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Competing interests
The authors declare no competing interests.

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