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Obesity and Its Association with Delayed Pregnancy Among Women Attending Healthcare Facilities in Damascus Hospitals: A Cross-Sectional Study

Mays Melli
Syrian Private University
Douha Albastaty
Syrian Private University
Haidar Yousef
haidaryousef2023@gmail.com

Damascus University
raaed ABDALLAH
Syrian Private University

Research Article

Keywords: Delayed conception, obesity, body mass index, polycystic ovary syndrome, diabetes mellitus, smoking, reproductive health, Syria, cross-sectional study

Posted Date: July 15th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10116239/v1

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Additional Declarations: No competing interests reported.

Abstract

Background

Delayed conception is a multifactorial condition with increasing prevalence globally. Obesity, metabolic disorders, and lifestyle factors are recognized as key contributors, but data from the Middle East remain limited. This study aimed to evaluate the association between body mass index (BMI), polycystic ovary syndrome (PCOS), diabetes mellitus, smoking exposure, and delayed conception (1 year of unsuccessful attempts) among women of reproductive age in Syria.

Methods

A cross-sectional study was conducted between March and April 2026 at Al-Zahrawi Hospital and Damascus Hospital (Al-Mujtahid Hospital) using convenience sampling. A total of 401 women aged ≥ 18 years completed a validated questionnaire (Cronbach's α = 0.74) covering demographic, anthropometric, behavioral, medical, and reproductive health data. BMI was calculated from self-reported height and weight. Chi-square tests were used to examine associations, with statistical significance set at $p < 0.05$.

Results

The mean age distribution showed that 61.3% of participants were aged 20–35 years. More than half of the women were obese (55.6%), with an additional 22.4% classified as overweight. Delayed conception was reported by 52.4% of participants. Significant associations were found between obesity and menstrual irregularities ($p < 0.001$). Among overweight and obese women, PCOS was significantly associated with delayed conception ($p < 0.001$; OR = 2.60), as was diabetes mellitus when overweight and obese groups were combined ($p = 0.022$). Active or passive smoking was also associated with increased likelihood of delayed conception (60.6% vs. 43.9%; OR = 1.96; 95% CI: 1.32–2.92; $p = 0.001$).

Conclusions

Overweight, obesity, PCOS, diabetes mellitus, and tobacco exposure (active or passive) are significantly associated with delayed conception among women of reproductive age in Syria. These findings highlight the need for routine BMI assessment, early screening for PCOS and diabetes, and targeted lifestyle interventions, including smoking cessation programs, as integral components of fertility care in the region.

Introduction

Delayed conception represents a growing reproductive health concern worldwide, with increasing evidence linking metabolic and behavioral factors to reduced fertility among women of reproductive age

[1]. The global rise in obesity, polycystic ovary syndrome (PCOS), type 2 diabetes mellitus, and tobacco exposure has drawn attention to potentially modifiable risk factors that may precede or exacerbate difficulties in conceiving [2]. While extensive research has been conducted in high-income settings, data from low- and middle-income regions, particularly the Middle East, remain limited despite the high and rising prevalence of obesity and metabolic disorders in these populations.

In Syria, as in many countries of the Middle East and North Africa (MENA) region, overweight and obesity rates among women of reproductive age have reached alarming levels, yet the association between these metabolic disturbances and delayed conception has not been systematically evaluated [3]. Furthermore, the interactive effects of PCOS, diabetes, and behavioral factors such as smoking and physical inactivity on fertility outcomes are poorly characterized in this context [4]. Understanding these relationships is essential for guiding preventive strategies and optimizing reproductive health care [5].

The present study was therefore designed to evaluate the association between selected metabolic and behavioral factors—specifically body mass index (BMI), PCOS, diabetes mellitus, active smoking, and passive smoking exposure—and delayed conception exceeding one year among women of reproductive age [6]. Using a cross-sectional design conducted at two major hospitals in Damascus, Syria, this research aims to identify modifiable risk factors and estimate their relative impact on fertility, thereby contributing evidence from an underrepresented population to the international literature [7].

The significance of this study lies in its focus on the most common factors associated with delayed conception among women of reproductive age, particularly obesity, metabolic disorders, and behavioral factors [8]. It contributes to clarifying the extent to which these factors affect reproductive health in a setting where their prevalence is high, thereby improving understanding of the true burden of the problem and directing attention toward modifiable and preventable risk factors [9].

This study aims to evaluate the association between selected metabolic and behavioral factors and delayed conception among women of reproductive age. Specifically, it seeks to determine the relationship between increased body mass index (BMI), polycystic ovary syndrome (PCOS), diabetes mellitus, smoking, and exposure to passive smoking with conception delays exceeding one year [10]. In addition, the study aims to compare the prevalence of delayed conception across different groups and estimate the magnitude of the impact of these factors on fertility in order to identify modifiable risk factors [11].

Methods

Study Design and Setting

This cross-sectional study was conducted between March and April 2026 at Al-Zahrawi Hospital and Damascus Hospital (Al-Mujtahid Hospital) in Damascus, Syria. These two facilities were selected as they represent major healthcare centers serving diverse populations from various socioeconomic backgrounds across the city and surrounding areas.

Participants and Sampling

A convenience sampling method was employed to recruit participants. Women were invited to take part voluntarily as they visited the hospitals for various healthcare services. The inclusion criteria comprised female hospital visitors aged 18 years and older. The sample size was calculated to be 200 participants from an estimated target population of 2,000 hospital visitors using a sample size calculator; however, a larger sample of 401 participants was ultimately enrolled to enhance statistical power.

Data Collection Instrument

Data were collected using a questionnaire specifically developed for the purposes of this study based on a review of the existing literature concerning obesity and delayed conception. The questionnaire consisted of several sections:

1. Demographic characteristics: age, marital status, educational level, and employment status
2. Anthropometric measurements: height, weight, and body mass index (BMI)
3. Health-related behaviors: physical activity and smoking habits
4. Chronic medical conditions: hypertension, diabetes mellitus, thyroid disorders, polycystic ovary syndrome (PCOS), and other conditions
5. Reproductive health information: menstrual cycle regularity, number of previous pregnancies, current attempts to conceive, duration of conception delay, and medical consultations for fertility difficulties

Reliability and Validity

The reliability of the questionnaire was assessed using Cronbach's alpha coefficient, which yielded a value of 0.74, indicating acceptable internal consistency. Content validity was established through review by experts in obstetrics, gynecology, and public health.

Anthropometric Measurements

BMI was calculated based on self-reported height and weight using the formula: weight (kg) / height (m^2). BMI was categorized according to standard World Health Organization classification criteria:

· Underweight: <18.5 kg/m^2

· Normal weight: 18.5–24.9 kg/m^2

· Overweight: 25.0–29.9 kg/m^2

· Obese: ≥30.0 kg/m^2

Data Collection Procedure

The objectives of the study were explained to participants through a written information sheet attached to the questionnaire. All participants provided written informed consent prior to enrollment. They were informed that all responses would remain anonymous, that answering all questions was not mandatory, and that they could withdraw from the survey at any time without consequence.

Statistical Analysis

Participant data were coded, entered into a computerized database, and analyzed using the Statistical Package for the Social Sciences (SPSS), version 26 (IBM Corp., Armonk, NY, USA). Descriptive statistical methods were employed, including frequency and percentage distributions for categorical variables. The Chi-square test was used to examine associations between categorical variables. Odds ratios (OR) with 95% confidence intervals (CI) were calculated where applicable. Statistical significance was established at a p-value of less than 0.05 ($p < 0.05$).

Ethical Considerations

Official approval was obtained from the administration of Al-Zahrawi Hospital and Damascus Hospital before starting the study. This study was conducted in accordance with the ethical standards of the Institutional Review Board (IRB) of the Faculty of Medicine at the Syrian Private University and with the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants after providing a full explanation of the study's objectives and procedures. Participants were assured of data confidentiality, voluntary participation, and the right to withdraw at any time without affecting their healthcare.

Results

Demographic Characteristics

The demographic characteristics of the participants (N = 401) are presented in Table 1. The most common age group was 20–35 years, representing 61.3% of the sample, followed by participants older than 35 years (33.9%), while women younger than 20 years accounted for 4.7% of the study population. The majority of participants were currently married (93.5%), whereas 6.5% were previously married.

Table 1
Demographic Characteristics of the Participants (N = 401): n (%)

Variable	Category	n (%)
	Age	
< 20 years	19	(4.7)
20–35 years	246	(61.3)
> 35 years	136	(33.9)
	Marital Status	
Currently married	375	(93.5)
Previously married	26	(6.5)
	Duration of Marriage	
< 1 year	11	(2.7)
1–3 years	88	(21.9)
4–6 years	107	(26.7)
> 6 years	195	(48.6)
	Educational Level	
Primary education	96	(23.9)
Secondary education	142	(35.4)
University education	126	(31.4)
Postgraduate studies	37	(9.2)
	Current Employment Status	
Housewife (unemployed)	247	(61.6)
Employed in a non health sector	128	(31.9)
Employed in the healthcare sector	26	(6.5)

With regard to the duration of marriage, the largest proportion of women had been married for more than six years (48.6%), followed by those married for 4–6 years (26.7%), and then those married for 1–3 years (21.9%). Women married for less than one year represented only 2.7% of the sample. Regarding educational level, secondary education constituted the highest proportion (35.4%), followed by university education (31.4%) and primary education (23.9%), whereas participants holding postgraduate degrees accounted for 9.2%.

In terms of employment status, the majority of participants were housewives and not employed (61.6%), while 31.9% worked in non-health-related sectors and 6.5% were employed in the healthcare sector.

Anthropometric Characteristics

Regarding anthropometric characteristics (Table 2), the most common height category was 160–169 cm (45.6%), followed by the 150–159 cm category (41.6%). Participants with a height below 150 cm accounted for 5.5% of the sample, whereas those taller than 170 cm represented 7.2%. The results also showed that the most prevalent weight category was 80–89 kg (30.2%), followed by 70–79 kg (26.7%), and 60–69 kg (17.7%). Participants weighing more than 90 kg constituted 13.0% of the sample, while only 3.0% weighed less than 50 kg.

Table 2
Height, Weight, and Body Mass Index (BMI) Characteristics (N = 401): n (%)

VariableCategory	**n (%)**
Height (cm)	
< 150	22 (5.5)
150–159	167 (41.6)
160–169	183 (45.6)
≥ 170	29 (7.2)
Weight (kg)	
< 50	12 (3.0)
50–59	38 (9.5)
60–69	71 (17.7)
70–79	107 (26.7)
80–89	121 (30.2)
≥ 90	52 (13.0)
Body Mass Index (BMI)	
Underweight	9 (2.2)
Normal weight	79 (19.7)
Overweight	90 (22.4)
Obese	223 (55.6)

Body mass index (BMI) analysis demonstrated that more than half of the participants were classified as obese, accounting for 55.6% of the sample. This was followed by the overweight category (22.4%) and the normal-weight category (19.7%). In contrast, underweight participants represented the smallest proportion of the sample, accounting for only 2.2%. These findings indicate a high prevalence of overweight and obesity among the women included in the present study.

Health Habits and Medical Conditions

The findings related to health habits in Table 3 showed that 55.6% of participants did not engage in regular physical exercise, whereas 44.1% reported exercising regularly. In addition, 50.6% of participants were either active smokers or exposed to passive smoking, compared with 49.4% who reported no exposure to smoking. Regarding the frequency of weekly physical activity, the highest proportion of participants reported no physical activity at all (51.4%). This was followed by exercising once or twice per week (32.7%), while 10.2% reported exercising three to four times weekly, and only 5.7% engaged in physical activity more than four times per week.

Table 3
Health Habits and Medical Conditions (N = 401): n (%)

VariableCategory	n (%)
Regular Exercise	
Yes	177 (44.1)
No	224 (55.6)
Smoking (Active or Passive)	
Yes	203 (50.6)
No	198 (49.4)
Frequency of Physical Activity per Week	
None	206 (51.4)
1–2 times	131 (32.7)
3–4 times	41 (10.2)
> 4 times	23 (5.7)
Hypertension	
Yes	40 (10.0)
No	361 (90.0)
Diabetes Mellitus	
Yes	47 (11.7)
No	354 (88.3)
Thyroid Disorders	
Yes	54 (13.5)
No	347 (86.5)
Asthma	
Yes	5 (1.2)
No	396 (98.8)
Autoimmune Diseases	
Yes	6 (1.5)
No	395 (98.5)

VariableCategory	n (%)
Gynecological Disorders	
Yes	7 (1.7)
No	394 (98.3)
Polycystic Ovary Syndrome (PCOS)	
Yes	101 (25.2)
No	300 (74.8)
Migraine	
Yes	10 (2.5)
No	391 (97.5)
Other Diseases	
Yes	14 (3.5)
No	387 (96.5)

With respect to chronic medical conditions, thyroid disorders were the most common, affecting 13.5% of participants, followed by diabetes mellitus (11.7%) and hypertension (10.0%). Polycystic ovary syndrome (PCOS) was reported by 25.2% of participants, making it one of the most prevalent medical conditions identified in the study population. In contrast, the prevalence of autoimmune diseases (1.5%), asthma (1.2%), gynecological disorders (1.7%), and migraine (2.5%) was relatively low. Additionally, 3.5% of participants reported having other medical conditions.

Reproductive Health Characteristics

The results regarding pregnancy-related characteristics in Table 4 showed that the majority of participants had regular menstrual cycles (58.6%), whereas 36.4% reported irregular cycles and only 5.0% reported intermittent menstrual cycles. Regarding the number of previous pregnancies, the distribution was relatively similar across categories. Women who had experienced three or more pregnancies constituted the largest group (28.2%), followed closely by those who had been pregnant once (27.9%) and twice (23.4%). Meanwhile, 20.4% of participants had never been pregnant.

Table 4
Pregnancy Related Characteristics (N = 401): n (%)

VariableCategory	**n (%)**
Menstrual Cycle Pattern	
Regular	235 (58.6)
Irregular	146 (36.4)
Intermittent	20 (5.0)
Number of Previous Pregnancies	
Never pregnant	82 (20.4)
One pregnancy	112 (27.9)
Two pregnancies	94 (23.4)
Three or more pregnancies	113 (28.2)
Are You Currently Trying to Conceive?	
Yes	186 (46.4)
No	215 (53.6)
Has Your Attempt to Conceive Continued for More Than One Year Without Success?	
Yes	210 (52.4)
No	191 (47.6)
Have You Consulted a Physician Because of Delayed Conception?	
Yes	224 (55.9)
No	177 (44.1)
Has a Physician Informed You That Excess Weight or Obesity May Be a Cause or Contributing Factor to Difficulty Conceiving?	
Yes	172 (42.9)
No	155 (38.7)
No medical consultation	74 (18.5)

The findings further indicated that 46.4% of participants were currently attempting to conceive, while 53.6% were not trying to become pregnant at the time of the survey. Among the participants, 52.4% reported that they had been attempting to conceive for more than one year without success, compared with 47.6% who had not experienced prolonged conception difficulties. Furthermore, more than half of

the participants (55.9%) had consulted a physician because of delayed conception, whereas 44.1% had not sought medical advice.

Regarding the potential role of body weight or obesity in conception difficulties, 42.9% of participants reported that a physician had informed them that excess weight or obesity could be a cause of, or a contributing factor to, delayed conception. In contrast, 38.7% stated that they had not received such an assessment, while 18.5% had never undergone a medical consultation regarding this issue.

Association Between BMI and Menstrual Cycle Regularity

Analysis of the relationship between menstrual cycle regularity and BMI (Table 5) revealed a statistically significant association between the two variables ($\chi^2 = 31$, $p < 0.001$). Regular menstrual cycles were most common among women with normal weight (77.2%), followed by overweight women (71.1%), and then underweight women (66.7%). In contrast, the highest proportion of irregular cycles was recorded among women with obesity (47.1%) compared to other BMI categories. Intermittent cycles were also most frequent in the obesity category (6.3%). These findings indicate an association between higher BMI and increased menstrual cycle disturbances.

Table 5
Relationship between menstrual cycle regularity and body mass index (N = 401): N (%)

BMI Category	Regular	Irregular	Intermittent	χ^2	P-value
Underweight	6 (66.7)	3 (33.3)	0	31	< 0.001
Normal weight	61 (77.2)	16 (20.3)	2 (2.5)		
Overweight	64 (71.1)	22 (24.4)	4 (4.4)		
Obesity	104 (46.4)	105 (47.1)	14 (6.3)		

Association Between BMI and Number of Previous Pregnancies

Analysis of the relationship between the number of previous pregnancies and BMI (Table 6) revealed a statistically significant association between the two variables ($\chi^2 = 29.4$, $p = 0.001$). The proportion of women with no previous pregnancy was highest in the underweight category (55.6%) compared to other BMI categories. The highest proportion of women with three or more previous pregnancies was recorded among overweight women (45.6%). Among women with obesity, the highest proportion had one previous pregnancy (33.2%). These findings indicate that the distribution of the number of previous pregnancies varies across BMI categories.

Table 6
Relationship between number of previous pregnancies and BMI (N = 401): N (%)

BMI Category	**No pregnancy**	**1 pregnancy**	**2 pregnancies**	**≥ 3 pregnancies**	**χ^2**	**P-value**
Underweight	5 (55.6)	2 (22.2)	1 (11.1)	1 (11.1)	29.4	0.001
Normal weight	18 (22.8)	18 (22.8)	22 (27.8)	21 (26.6)		
Overweight	10 (11.1)	18 (20.0)	21 (23.3)	41 (45.6)		
Obesity	49 (22.0)	74 (33.2)	50 (22.4)	50 (22.4)		

Association Between BMI and Delayed Conception

Analysis of the relationship between BMI and attempting pregnancy for more than one year without success (Table 7) revealed a statistically significant association between the two variables ($\chi^2 = 39.8$, $p < 0.001$). The highest proportion of women attempting pregnancy for more than one year without success was recorded among women with obesity (66.4%), compared to 44.4% among underweight women, 35.4% among normal-weight women, and 33.3% among overweight women. Conversely, the proportions of women not experiencing delayed conception were highest among normal-weight (64.6%) and overweight women (66.7%). These findings indicate that higher BMI, particularly obesity, is associated with an increased likelihood of attempting pregnancy for more than one year without success.

Table 7
Relationship between pregnancy success and BMI (N = 401): N (%)

BMI Category	Failure to conceive within one year		χ^2	P-value
	Yes	No	39.8	< 0.001
Underweight	4 (44.4)	5 (55.6)		
Normal weight	28 (35.4)	51 (64.6)		
Overweight	30 (33.3)	60 (66.7)		
Obesity	148 (66.4)	75 (33.6)		

Association Between Smoking and Delayed Conception

Active smoking or continuous exposure to passive smoking (Table 8) did not show a significant association with difficulty conceiving among overweight-only women ($p = 0.100$) or among women with obesity-only ($p = 0.104$), despite a higher smoking rate among those who attempted pregnancy for more than one year without success compared to others. In contrast, pooled analysis of the overweight and obesity categories combined revealed a significant association between smoking and difficulty conceiving ($p = 0.027$), with a smoking rate of 60.7% among women who experienced delayed

conception, compared to 48.1% among others. Smoking was also associated with an approximately 1.66-fold increased likelihood of difficulty conceiving among women who were overweight or obese (Table 9).

Table 8
Relationship between smoking and difficulty conceiving (> 1 year) according to overweight and obesity categories (N = 313): N (%)

BMI Category	Failure to conceive > 1 year	Smoking (-)	Smoking (+)	OR	χ^2	P-value
Overweight				2.14	2.7	0.100
	No	31 (51.7)	29 (48.3)			
	Yes	10 (33.3)	20 (66.7)			
Obesity				1.59	2.6	0.104
	No	39 (52.0)	36 (48.0)			
	Yes	60 (40.5)	88 (59.5)			
Total (Overweight + Obesity)				1.66	4.87	0.027
	No	70 (51.9)	65 (48.1)			
	Yes	70 (39.3)	108 (60.7)			

Table 9
Association Between Polycystic Ovary Syndrome (PCOS) and Difficulty Conceiving (> 1 Year) According to Overweight and Obesity Categories (N = 313): n (%)

BMI Category	Pregnancy Failure > 1 Year	PCOS (+) n (%)	PCOS (−) n (%)	OR	χ^2	P value
Overweight	No	9 (15.0)	51 (85.0)	2.43	2.80	0.094
	Yes	9 (30.0)	21 (70.0)			
Obesity	No	14 (18.7)	61 (81.3)	2.43	6.96	0.008
	Yes	53 (35.8)	95 (64.2)			
Overall (Overweight + Obesity)	No	23 (17.0)	112 (83.0)	2.60	12.20	< 0.001
	Yes	62 (34.8)	116 (65.2)			

Association Between PCOS and Delayed Conception

The presence of polycystic ovary syndrome (PCOS) was not significantly associated with difficulty conceiving among overweight women alone (p = 0.094), despite a higher prevalence of PCOS among

women who experienced delayed conception for more than one year (30.0%) compared with those who did not (15.0%). In contrast, a significant association was observed among obese women (p = 0.008). The prevalence of PCOS reached 35.8% among women whose attempts to conceive had continued unsuccessfully for more than one year, compared with 18.7% among those who did not experience prolonged conception difficulties. Furthermore, women with PCOS were approximately 2.4 times more likely to experience conception attempts lasting longer than one year without success compared with women without PCOS.

When overweight and obese women were analyzed together (Table 9), a clear and statistically significant association was identified between PCOS and difficulty conceiving (p < 0.001). The prevalence of PCOS was higher among women who experienced delayed conception (34.8%) than among those who did not (17.0%). Moreover, women with PCOS were approximately 2.6 times more likely to experience unsuccessful conception attempts lasting more than one year.

Association Between Diabetes Mellitus and Delayed Conception

The analysis (Table 10) demonstrated that diabetes mellitus was not significantly associated with failure to conceive for more than one year among overweight women alone (p = 0.370) or obese women alone (p = 0.154). However, when the overweight and obesity categories were combined, a statistically significant association emerged between diabetes mellitus and difficulty conceiving (p = 0.022). Among overweight and obese women collectively, the prevalence of diabetes was higher among those whose attempts to conceive had continued unsuccessfully for more than one year (18.0%) compared with those who did not experience prolonged conception difficulties (8.9%).

Table 10
Association Between Diabetes Mellitus and Difficulty Conceiving (> 1 Year) According to Overweight and Obesity Categories (N = 313): n (%)

BMI Category	Pregnancy Failure > 1 Year	Diabetes (+) n (%)	Diabetes (−) n (%)	χ^2	P value
Overweight	No	3 (5.0)	57 (95.0)	0.80	0.370
	Yes	3 (10.0)	27 (90.0)		
Obesity	No	9 (12.0)	66 (88.0)	2.031	0.154
	Yes	29 (19.6)	119 (80.4)		
Overall (Overweight + Obesity)	No	12 (8.9)	123 (91.1)	5.249	0.022
	Yes	32 (18.0)	146 (82.0)		

Discussion

The present study demonstrated a high prevalence of overweight and obesity among participants, with obesity accounting for more than half of the study population (55.6%). This alarming finding is

consistent with recent epidemiological reports from the World Health Organization, which classify countries in the Middle East and North Africa (MENA) region among those with the highest rates of obesity among women of reproductive age worldwide [30].

Our findings also revealed a significant association between increased body mass index (BMI) and menstrual irregularities ($p < 0.001$). More than 50% of obese women experienced menstrual disturbances (irregular or intermittent cycles), compared with approximately 23% of women with normal body weight. These findings are consistent with a Saudi Arabian study that reported an increase in oligomenorrhea from 18% to 32% and amenorrhea from 2% to 13% as BMI increased, while the overall prevalence of ovulatory disorders rose from 32% to 55% with increasing BMI [31].

Elevated BMI at both extremes of the weight spectrum has been associated with an increased risk of menstrual disturbances, although findings from large-scale studies have been inconsistent. A recent study published in 2025 evaluated the relationship between BMI and menstrual irregularity using data from 8,745 individuals and 191,426 menstrual cycles collected through a smartphone application. Cubic regression models demonstrated a J-shaped relationship for average cycle length, cycle length variability, and absent or infrequent menstrual bleeding, indicating that both high and low BMI values outside the normal range were associated with longer and more irregular menstrual cycles. An inverted J-shaped relationship was observed for the proportion of biphasic cycles, suggesting an increased risk of anovulatory cycles at both high and low BMI levels [32].

Analysis of the relationship between BMI and unsuccessful conception attempts lasting more than one year demonstrated a statistically significant association between the two variables. Approximately 66% of obese women experienced conception difficulties, indicating a substantial burden of metabolic risk factors among women of reproductive age.

These findings are in line with global trends demonstrating increasing rates of obesity among women of reproductive age. A Saudi Arabian study conducted among women attending infertility clinics reported obesity in approximately 38% of participants and overweight in 42% [31]. Similarly, another cross-sectional study conducted in the United States found that 42% of women with infertility were obese [33].

In our study, 70.3% of women with PCOS reported attempting to conceive for more than one year without success, compared with 46.3% of women without PCOS. This association was statistically significant ($p < 0.001$, OR = 2.74). This prevalence is relatively high compared with findings from some regional studies. A systematic review and meta-analysis conducted in Gulf countries (Saudi Arabia, Qatar, Kuwait, and Oman) reported that approximately 30% of infertile women had PCOS, with a higher prevalence among obese women than non-obese women (27% vs. 18%), highlighting the substantial contribution of PCOS to infertility in the region [34].

Furthermore, a systematic review conducted across the Middle East found that the prevalence of PCOS among women seeking care for infertility ranged from 10.4% to 37.4%, with an average prevalence of 23.4%. The highest rates were observed in specialized infertility centers [35].

In the present study, 72.3% of women with diabetes mellitus reported unsuccessful conception attempts lasting longer than one year, compared with 49.7% of women without diabetes. This association was statistically significant (p = 0.004) and was associated with a markedly increased likelihood of delayed conception (OR = 2.64; 95% CI: 1.35–5.18).

A Saudi Arabian study involving women with type 2 diabetes mellitus found that 88.7% experienced sexual dysfunction, a factor known to negatively affect fertility, with the impact increasing with age and obesity. Although the study did not directly assess delayed conception, it supports the substantial reproductive burden associated with diabetes among women in the region [36]. Additionally, a systematic review of women of reproductive age in the Middle East and North Africa reported that the prevalence of type 2 diabetes ranged from 7–11% in most Gulf countries (Saudi Arabia: 7.2–8.0%; Qatar: 10.7%). Diabetes was more common among women with reproductive health problems than among the general female population [37].

Smoking and chronic exposure to secondhand smoke were also associated with an increased likelihood of delayed conception in our study. The prevalence of unsuccessful conception attempts lasting longer than one year was 60.6% among smokers or women exposed to passive smoking, compared with 43.9% among non-exposed women (OR = 1.96; 95% CI: 1.32–2.92; p = 0.001).

A study published in the United States in 2018 demonstrated a positive dose-response relationship between the number of cigarettes smoked per day and delayed conception. Compared with non-smokers, smokers were 54% more likely to report conception delays exceeding 12 months. The effects of passive smoke exposure alone were only slightly less pronounced than those associated with direct smoking by either partner or by both partners. The majority of studies consistently show that smokers have higher rates of infertility, lower fertility potential, and longer times to conception compared with non-smokers [38].

Strengths and Limitations

Strengths: This study provides valuable data from an underrepresented region (Syria/Middle East) and addresses multiple metabolic and behavioral factors simultaneously. The relatively large sample size (N = 401) and the comprehensive questionnaire covering diverse health aspects are notable strengths.

Limitations: Several limitations warrant consideration. The cross-sectional design prevents causal inference. Convenience sampling from two Damascus hospitals limits generalizability to the general population. Self-reported height and weight may have introduced reporting bias, potentially underestimating BMI. The small sample size in some BMI subgroups (e.g., underweight, n = 9) reduced statistical power. Unmeasured confounders include male factor infertility, timing of intercourse, and prior contraceptive use. Smoking assessment did not quantify cumulative exposure. Finally, the short study period (March–April 2026) could not account for seasonal or temporal variations. Nevertheless, this study offers important preliminary data from the Middle East and identifies modifiable risk factors for future research.

Conclusion

The present study demonstrated a high prevalence of overweight and obesity among women of reproductive age, with a significant association between elevated body mass index (BMI), menstrual cycle disturbances, and an increased likelihood of delayed conception. The findings also showed that polycystic ovary syndrome (PCOS) and diabetes mellitus were significantly associated with impaired fertility and higher rates of delayed conception.

In addition, both active smoking and exposure to passive smoking were associated with an increased risk of delayed conception, highlighting the important role of metabolic and behavioral factors in reproductive health. Overall, the results suggest that delayed conception is a multifactorial condition in which obesity, hormonal disturbances, and lifestyle-related factors interact to adversely affect fertility outcomes.

Recommendations

Based on the findings of this study, the following recommendations are proposed:

1. Prioritize obesity prevention and promote healthy lifestyle modifications among women of reproductive age through community-based education and awareness programs.
2. Incorporate BMI assessment as a routine and essential component of fertility evaluation in all healthcare settings.
3. Implement early screening for PCOS and diabetes mellitus in women presenting with menstrual irregularities or delayed conception.
4. Strengthen smoking cessation programs and increase awareness of the adverse effects of smoking and passive smoking on fertility through targeted public health campaigns.
5. Adopt a comprehensive and multidisciplinary approach to the evaluation and management of delayed conception that addresses both metabolic and behavioral risk factors, involving obstetricians, endocrinologists, nutritionists, and mental health professionals.

Abbreviations

· BMI
Body Mass Index
· CI
Confidence Interval
· IRB
Institutional Review Board
· MENA
Middle East and North Africa
· OR
Odds Ratio

· PCOS
Polycystic Ovary Syndrome
· SPSS
Statistical Package for the Social Sciences
· WHO
World Health Organization

Declarations

Ethics approval and consent to participate

This study was conducted in accordance with the ethical standards of the Institutional Review Board (IRB) of the Faculty of Medicine at the Syrian Private University and with the principles of the Declaration of Helsinki. Official approval was obtained from the administration of Al-Zahrawi Hospital and Damascus Hospital (Al-Mujtahid Hospital) prior to data collection. Written informed consent was obtained from all participants after providing a full explanation of the study's objectives, procedures, potential risks, and benefits. Participants were assured of data confidentiality, voluntary participation, and the right to withdraw at any time without affecting their healthcare.

Consent for publication

Not applicable. This manuscript does not contain any individual person's data in any form (including individual details, images, or videos).

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due to the sensitive nature of the reproductive health data and the institutional policy of the Syrian Private University, which restricts public sharing to protect participant privacy. However, de-identified data are available from the corresponding author upon reasonable request and with the permission of the Institutional Review Board.

Competing Interests

The authors declare no competing interests.

Funding

Not applicable. This study did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Authors' contributions

Mays Melli conceptualized the study, analyzed the data, and drafted the manuscript. Raed K. Abdallah and Douha Albastaty supervised the study and critically revised the manuscript. Haidar Yousef managed journal correspondence and reviewed the final manuscript. All authors read and approved the final manuscript.

Acknowledgements

Not applicable.

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Tables

Tables 1 to 10 are available in the Supplementary Files section.

Supplementary Files

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