

# Prevalence of Depression among Women Using Hormonal Contraceptive Use: Insights from a Hospital-Based Cross-Sectional Study

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**Abstract:** *Background:* Hormonal contraceptives (HC) serve as a key component in managing premenopausal symptoms and controlling birth rates. However, mood-related side effects, ranging from minor disturbances to severe clinical depression, are the primary reasons for discontinuation.

*Objective:* To assess the prevalence of depression among women who use hormonal contraceptive methods. Additionally, the study aims to explore the association between specific types of contraceptives—such as oral pills, implants, injectables—and the prevalence of depression.

*Methods:* From October 2023 to October 2024, a total of 1500 women between the ages of 21 and 45 who currently take hormonal contraception participated in this hospital-based cross-sectional study, which was carried out at the tertiary care hospital at King Fahd Central Hospital's outpatient gynecology clinic.

*Results:* The most frequent age categories were from 26 to 40 years (85.7%). The majority of the studied cases were non-lean (82.6%). Most of the cases had parity from 1 to 4 (97.1%). Women were mainly of a low social class (77.1%). Social problems were found in (21.8%). Hypertension and diabetes mellitus were in 4.9% and 3.2% respectively. The most frequent contraceptive method were OCPs (40.3%), followed by POPs (31.2%), then subdermal implants (16.3%), injectable (8.6%), hormonal IUD (2.2%) and patches (1.4%). Most of the studied women used such method from 3 to 6 years (88.2%). Prevalence of depression among the studied cases was (8.7%; CI: 7.3%–10.2%). Obese individuals demonstrated a significantly higher prevalence of depression (11.5%) compared to overweight (8.5%) and lean individuals (5.0%), with a statistically significant association ( $p=0.015$ ). Additionally, obese participants were more likely to have diabetes mellitus (27.1%), face social issues (21.8%), and belong to a low socioeconomic class (77.1%). Regarding contraceptive types, depression was notably less common among women using combined oral contraceptives (COCs) and progesterone-only pills (POPs), with rates of 4.6% and 4.5%, respectively. In contrast, higher rates of depression were observed in users of subdermal implants (19.2%), injectables (18.6%), hormonal IUDs (18.2%), and hormonal patches (19.0%) ( $p<0.001$ ). The duration of contraceptive use also played a significant role, with depression rates increasing progressively from 2.8% for women using contraceptives for 1–2 years to 3.7% for 3–4 years and 12.7% for 5–6 years. The highest rate of depression, 37.7%, was observed among women using hormonal contraceptives for seven or more years ( $p<0.001$ ).

*Conclusion:* Given the observed associations between certain hormonal contraceptives, prolonged use, and elevated depression rates, clinicians should adopt a proactive approach in assessing patients' mental well-being, especially for women with additional risk factors like high BMI, socioeconomic challenges, or chronic conditions such as diabetes. Screening tools like the PHQ-9 should be routinely used during consultations to monitor for early signs of depression, allowing for timely intervention if needed.

**Keywords:** Hormonal Contraceptive, Depression Prevalence.

## INTRODUCTION

A crucial component of family planning, contraception allows partners to choose whether to prevent conception, arrange when to start and stop having children, and establish the time between pregnancies. In addition to increasing the likelihood that parents would invest in their future children and improve the standard of care they offer, this may free up time for other priorities. Contraception benefits the environment, economics, and education in addition to personal and health reasons by reducing overpopulation in some regions of the world. Contraception is mentioned under the United Nations

Declaration of Human Rights for these and much more reasons [1].

Affective problems are more likely to occur during times of estrogen instability, such as adolescence, premenstruation, and the postpartum period. This risk may be influenced by the way gonadal steroidal hormones and central nervous system neurotransmitters interact. Estrogen increases the number of serotonergic receptors, the activity of monoamines, and the transport and absorption of neurotransmitters in animal studies [2].

Unfortunately, there are adverse consequences associated with all forms of contraception. Prior research has demonstrated a positive correlation between hormonal birth control techniques and later mood disorders, depression diagnoses, antidepressant

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use, and even suicidal thoughts. Indeed, mood swings were thought to be among the primary causes of stopping hormonal contraception or choosing an other treatment [3]. However, the findings of two systematic studies have refuted the possibility that hormonal contraception might exacerbate symptoms of pre-existing depression or that there is a direct link between it and depression [4, 5]. As a result, it is still unclear and uncertain whether the two are favorably connected [1].

Some studies found that the most common reason why women stopped using HC methods was the development of mood disorders and depression symptoms during usage [6]. According to a different research, women using OCPs had depressed symptoms and reduced libido, which subsided once the OCPs were stopped. Additionally, HC usage has been linked to a higher risk of depression, according to a research on the relationship between hormonal contraception and depression [7]. One of the most common reasons for stopping HC is a change in mood, which can vary from mild disturbances to severe clinical depression. The relationship between HC and negative mental consequences is still up for debate despite the facts [8].

Additionally, women who have a personal or family history of depression should be cautious since hormonal contraception has been linked to depression or low mood [9]. Finally, it is challenging to draw firm conclusions on the negative mood or depression effects of HCs on their users due to inconsistent study methodologies and a lack of standardized measures [2].

It is critical to take depression risk factors into account while evaluating the association between depression and contraception. Female sex, financial or social difficulties, significant or chronic illnesses, family history, and drug abuse are a few risk factors [10]. Therefore, determining the prevalence of depression among women who use the hormonal contraceptive (HC) technique and investigating the relationship between HC usage and depression are the goals of this study.

## **PATIENTS AND METHODS**

After written consents from the patients, this Hospital Based Cross-Sectional Study was conducted at tertiary care hospital at King Fahd Central Hospital's outpatient gynecology clinic from October 2023 till October 2024 and performed on total 1500 women

aged 21 to 45, who are current users of hormonal contraceptives with the following inclusion criteria:

### **Inclusion Criteria**

Women who use hormonal contraception methods aged 21–45 years with BMI 20-35 kg/m<sup>2</sup>.

### **Exclusion Criteria**

Women with prior established history of depression, Women with mental or psychiatric disorders, Women who use hormonal and non-hormonal methods.

The pathophysiology of having a greater risk of depression due to previously altered hormone levels, such as in depression, adolescence, or menopausal age, and exogenous hormonal usage, might be confused by a history of depression and being younger than 21 or older than 45. Additionally, in order to maintain more reliable findings, we eliminated individuals who used hormonal and nonhormonal treatments [1].

The study has the following specific objectives:

### **Primary Objective:**

- To assess the prevalence of depression among women using hormonal contraceptive methods.

### **Secondary Objectives:**

- To analyze the association between the type of hormonal contraceptive (e.g., pills, implants, injectables) and the prevalence of depression.
- To evaluate the relationship between the duration of HC use and the severity of depression.
- To identify demographic and health-related factors (e.g., BMI, socioeconomic status, chronic conditions) contributing to depression in HC users.

### **Study Procedures**

All participants were submitted to the following:

A survey was randomly collected from the participants during follow up in gynaecological clinic. Demographic information, obstetric and gynecological history (including use of contraception, reason and duration of use, type of contraception), psychiatric history, past medical history, use of depressogenic

medications, social history (including alcohol, smoking, and illicit use), and Patient Health Questionnaire-9 (PHQ9), a tool for screening for depression, make up the seven sections of the expert-approved checklist, which is based on the literature currently in circulation [12].

The Patient Health Questionnaire-9 (PHQ-9) for common mental illnesses was used to gather the data. Questions on sociodemographics and the use of hormonal contraception were included in the questionnaire.

### Patient Health Questionnaire-9 (PHQ-9)

It is a popular self-administered depression screening and interim diagnostic tool. English is the original language. However, the translated version was employed in our study because our study population is Arabic [10, 11].

Each of the nine items in PHQ 9 has four options for how frequently symptoms occur: "Not at all," "Several days," "More than half of the days," and "Nearly every day." Normal or no depression (none-minimal depression) is indicated by a total score of 0–4, mild depression is indicated by a score of 5–9, moderate depression by a score of 10–14, moderately severe depression by a score of 15–19, and severe depression by a score of 20 or above [1].

### The Patient Health Questionnaire-9 (PHQ-9) Scoring [12]

A history of manic or hypomanic episodes, normal bereavement, and medical reasons of sadness should all be ruled out by the doctor.

#### Step 1: Questions 1 and 2

Need one or both of the first two questions endorsed with a "2" or a "3" (2 = "More than half the days"; 3 = "Nearly every day")

#### Step 2: Questions 1 through 9

To calculate the total symptom count, at least five boxes must be checked inside the darkened region of the form. (Questions 1-8 must be supported as a "2" or a "3," whereas Question 9 must be endorsed as a "1," a "2," or a "3").

#### Step 3: Question 10

This question must be supported as "somewhat difficult" or "very difficult" or "extremely difficult."

## Use of the PHQ-9 for Treatment Selection and Monitoring [12]

### Step 1

A depression diagnosis that requires therapy or a change in treatment must have at least one of the first two items answered positively ("more than half the days" or "nearly every day") in the last two weeks. Furthermore, the ninth question, concerning trouble at work or home or getting along with people, should be replied at least "somewhat difficult"

### Step 2

Add the total points for each of the columns 2-4 separately

(Column 1 = Several days; Column 2 = More than half the days; Column 3 = Nearly every day. Add the totals for each of the three columns together. This is the Total Score

The Total Score = the Severity Score

### Step 3

Review the Severity Score using the following Table.

PHQ-9 Score	Provisional Diagnosis	Treatment Recommendation
		<i>Patient Preferences should be considered</i>
5-9	Minimal Symptoms*	Support, educate to call if worse, return in one month
10-14	Minor depression ++ Dysthymia* Major Depression, mild	Support, watchful waiting Antidepressant or psychotherapy Antidepressant or psychotherapy
15-19	Major depression, moderately severe	Antidepressant or psychotherapy
>20	Major Depression, severe	Antidepressant and psychotherapy (especially if not improved on monotherapy)

\*If symptoms present  $\geq$  two years, then probable chronic depression which warrants antidepressants or psychotherapy (ask "In the past 2 years have you felt depressed or sad most days, even if you felt okay sometimes?").

++If symptoms present  $\geq$  one month or severe functional impairment, consider active treatment.

## Outcome Measures

Primary outcome included the prevalence of Depression among women receiving hormonal contraception.

## Secondary Outcome Included

1. Type of hormonal contraceptive methods (pills, Patches, Injections).

2. Duration of hormonal contraceptives usage.
3. Degree of depression (mild, moderate and severe).
4. The association between hormonal contraception and depression.

### Ethical Considerations

The patient data was kept anonymous. Data was presented by diagnosis rather than by patient name, and patient anonymity was safeguarded. All subjects provided informed permission, which was documented in Arabic and validated by date and time. Confidentiality was ensured by assigning a number to the patient's initials, and only the investigator knew it.

### Statistical Analysis

The acquired data was processed, tabulated, and statistically analyzed by IBM SPSS statistics (Statistical Package for Social Sciences) software version 28.0, IBM Corp., Chicago, USA, 2021. Qualitative data were expressed in terms of numbers and percentages, and they were compared using the Chi square test and

Fisher's exact test. The post-hoc Bonferroni test was employed for pairwise comparisons. Logistic regression for independent variables influencing depression. A p-value of  $\leq 0.050$  was considered significant, otherwise non-significant.

### RESULTS

Table 1 showed demographic characteristics of the studied cases. The most frequent age categories were from 26 to 40 years (85.7%). The majority of the studied cases were non-lean (82.6%). Most of the cases had parity from 1 to 4 (97.1%). Women were mainly of a low social class (77.1%). Social problems were found in (21.8%). Hypertension and diabetes mellitus were in 4.9% and 3.2% respectively.

Table 2 showed that: The most frequent contraceptive method were OCPs (40.3%), followed by POPs (31.2%), then subdermal implants (16.3%), injectable (8.6%), hormonal IUD (2.2%) and patches (1.4%). Most of the studied women used such method from 3 to 6 years (88.2%).

Table 3 showed that: Prevalence of depression among the studied cases was (8.7%; CI: 7.3%–10.2%).

**Table 1: Demographic Characteristics of the Studied Cases**

Characteristics		n (%)	95% CI
Age (years)	21-25	71 (4.7%)	3.7%–5.9%
	26-30	333 (22.2%)	20.2%–24.4%
	31-35	576 (38.4%)	36.0%–40.9%
	36-40	376 (25.1%)	22.9%–27.3%
	41-45	144 (9.6%)	8.2%–11.2%
BMI categories	Lean	261 (17.4%)	15.5%–19.4%
	Overweight	866 (57.7%)	55.2%–60.2%
	Obese	373 (24.9%)	22.7%–27.1%
Parity	1-2	493 (32.9%)	30.5%–35.3%
	3-4	963 (64.2%)	61.7%–66.6%
	≥5	44 (2.9%)	2.2%–3.9%
Socioeconomic class	Low	1157 (77.1%)	75.0%–79.2%
	Moderate	343 (22.9%)	20.8%–25.0%
Social problems	Yes	327 (21.8%)	19.8%–23.9%
	No	1173 (78.2%)	76.1%–80.2%
Hypertension	Yes	74 (4.9%)	3.9%–6.1%
	No	1426 (95.1%)	93.9%–96.1%
Diabetes mellitus	Yes	48 (3.2%)	2.4%–4.2%
	No	1452 (96.8%)	95.8%–97.6%

Total=1500.

**Table 2: Hormonal Contraceptive use among the Studied Cases**

Characteristics		n (%)	95% CI
Methods	COCs	604 (40.3%)	37.8%–42.8%
	POPs	468 (31.2%)	28.9%–33.6%
	Subdermal implants	245 (16.3%)	14.5%–18.3%
	Injectable	129 (8.6%)	7.3%–10.1%
	Hormonal IUD	33 (2.2%)	1.5%–3.0%
	Hormonal patches	21 (1.4%)	0.9%–2.1%
Duration	1-2 years	108 (7.2%)	6.0%–8.6%
	3-4 years	739 (49.3%)	46.7%–51.8%
	5-6 years	584 (38.9%)	36.5%–41.4%
	≥7 years	69 (4.6%)	3.6%–5.7%

Total=1500. COCs: Combined Oral Contraceptive. POPs: Progesterone Only Pills. IUD: Intrauterine Device. CI: Confidence Interval.

**Table 3: Prevalence of Depression (PHQ-9) among the Studied Cases**

PHQ-9	n (%)	95% CI
No Depression	1370 (91.3%)	89.8%–92.7%
Minimal	109 (7.3%)	6.0%–8.7%
Mild	13 (0.9%)	0.5%–1.4%
Moderate	8 (0.5%)	0.3%–1.0%
Depression	130 (8.7%)	7.3%–10.2%

Total=1500. CI: Confidence Interval.

**Table 4: Association between Depression and Demographic Characteristics**

Characteristics		Total	Depression	No depression	p-value
Age	21-25 years	71	6 (8.5%)	65 (91.5%)	#0.900
	26-30 years	333	32 (9.6%)	301 (90.4%)	
	31-35 years	576	48 (8.3%)	528 (91.7%)	
	36-40 years	376	34 (9.0%)	342 (91.0%)	
	41-45 years	144	10 (6.9%)	134 (93.1%)	
BMI categories	Lean	261	13 (5.0%)a	248 (95.0%)	#0.015*
	Overweight	866	74 (8.5%)a	792 (91.5%)	
	Obese	373	43 (11.5%)b	330 (88.5%)	
Parity	1-2	493	41 (8.3%)	452 (91.7%)	#0.785
	3-4	963	84 (8.7%)	879 (91.3%)	
	≥5	44	5 (11.4%)	39 (88.6%)	
Socioeconomic class	Low	1157	128 (11.1%)	1029 (88.9%)	#<0.001*
	Moderate	343	2 (0.6%)	341 (99.4%)	
Social problems	Yes	327	44 (13.5%)	283 (86.5%)	#<0.001*
	No	1173	86 (7.3%)	1087 (92.7%)	
Hypertension	Yes	74	10 (13.5%)	64 (86.5%)	#0.129
	No	1426	120 (8.4%)	1306 (91.6%)	
Diabetes mellitus	Yes	48	13 (27.1%)	35 (72.9%)	§<0.001*
	No	1452	117 (8.1%)	1335 (91.9%)	

Percentages were taken per characteristic (from total of rows). BMI: Body Mass Index. #Chi square test. §Fisher's Exact test. Homogenous groups had the same symbol "a and b" based on post hoc Bonferroni test.

**Table 5: Association between Depression and Hormonal Contraceptive use**

Characteristics		Total	Depression	No depression	p-value
Methods	COCs	604	28 (4.6%)a	576 (95.4%)	#<0.001*
	POPs	468	21 (4.5%)a	447 (95.5%)	
	Subdermal implants	245	47 (19.2%)b	198 (80.8%)	
	Injectable	129	24 (18.6%)b	105 (81.4%)	
	Hormonal IUD	33	6 (18.2%)b	27 (81.8%)	
	Hormonal patches	21	4 (19.0%)b	17 (81.0%)	
Duration	1-2 years	108	3 (2.8%)a	105 (97.2%)	#<0.001*
	3-4 years	739	27 (3.7%)a	712 (96.3%)	
	5-6 years	584	74 (12.7%)b	510 (87.3%)	
	≥7 years	69	26 (37.7%)c	43 (62.3%)	

Percentages were taken per characteristic (from total of rows). # Chi square test. Homogenous groups had the same symbol "a, b and c" based on post hoc Bonferroni test.

Table 4 showed that: Depression was significantly more frequent in obese cases than overweight and lean, more frequent in cases with low socioeconomic class, social problems and diabetes mellitus.

Table 5 showed that: Depression was significantly less frequent in cases that used COCs and POPs. Depression was significantly less frequent in cases that used hormonal contraceptive methods for 1-4 years, followed by 5-6 years and most frequent in ≥7 years.

Table 6 showed that: After analysis the studied factors by logistic regression, the following were the significant independent factors affecting increasing the likelihood of depression in the studied cases: Overweight and obese with increasing the effect by increasing BMI category. Low socioeconomic class, diabetes mellitus, methods of contraception (subdermal implants, injectable, hormonal IUD and hormonal patches). Duration of contraception (5-6 years and ≥7 years) with increasing the effect by increasing the duration.

**Table 6: Logistic Regression for Independent Factors Affecting having Depression**

Factors	$\beta$	SE	p-value	Odds ratio 95% CI
BMI (lean was a reference)			0.022*	
BMI (overweight)	0.73	0.35	0.036*	2.07 (1.05–4.08)
BMI (obese)	1.02	0.37	0.006*	2.77 (1.34–5.69)
Socioeconomic class (low) (moderate was a reference)	3.24	0.74	<0.001*	25.60 (6.01–109.04)
Socioeconomic problems	0.51	0.22	0.022*	1.67 (1.08–2.60)
Diabetes mellitus	1.58	0.41	<0.001*	4.87 (2.18–10.89)
Method (subdermal implants)	1.65	0.24	<0.001*	5.20 (3.24–8.34)
Method (Injectable)	1.83	0.30	<0.001*	6.21 (3.43–11.26)
Method (hormonal IUD)	1.94	0.55	<0.001*	6.99 (2.39–20.41)
Method (hormonal patches)	2.23	0.73	0.002*	9.31 (2.20–39.30)
Duration (1-2 years was a reference)			<0.001*	
Duration (3-4 years)	0.27	0.63	0.676	1.30 (0.38–4.52)
Duration (5-6 years)	1.60	0.62	0.009*	4.94 (1.48–16.49)
Duration (≥7 years)	3.08	0.67	<0.001*	21.83 (5.92–80.54)
Constant	-8.19	1.02	<0.001*	

$\beta$ : Regression coefficient. SE: Standard error. CI: Confidence interval, \*significant.

## DISCUSSION

Major depressive disorder ranks as the second most significant health-related cause of disability among women [7]. Women generally experience higher rates of depression compared to men [5]. Research suggests that hormonal contraceptives (HC) may influence mood, with negative mood shifts often attributed to the progesterone component, while estrogen is linked to positive mood effects [13]. For example, elevated progesterone levels have been associated with low mood symptoms that some women experience postpartum. Consequently, the likelihood of mood disturbances may be reduced in users of combined hormonal contraceptives that contain both estrogen and progesterone [10]. Additionally, mood effects of HCs may stem from psychological perceptions rather than solely from their pharmacological action [14].

Determining the prevalence of depression among hormonal and non-hormonal contraceptive users, as well as the risk factors that lead to depression in women receiving contraception, was emphasized as a primary area of interest because mood swings in hormonal contraceptive users represent significant conflict and may be related to depression [1].

In order to determine the prevalence of depression among women who use the hormonal contraceptive (HC) technique and to investigate the relationship between HC usage and depression, this study was carried out.

The current research employs Hospital Based Cross-Sectional Study was conducted at tertiary care hospital at King Fahd Central Hospital's outpatient gynecology clinic from October 2023 till October 2024 and performed on total 1500 women aged 21 to 45, who are current users of hormonal contraceptives.

Regarding demographic Characteristics, our study results revealed that the majority of participants were aged 26-40 (85.7%), predominantly overweight (57.7%) or obese (24.9%), and primarily from low socioeconomic backgrounds (77.1%). Additionally, 21.8% reported social issues, while 4.9% and 3.2% had hypertension and diabetes, respectively. This data sets a context for understanding the varied socioeconomic and health backgrounds of participants, which could influence the study's outcomes.

These demographic trends are consistent with who Salad *et al.* [10]. conducted a cross-sectional study at

Benadir Mother-and-Child Hospital in Mogadishu to assess depression among Somali women using hormonal contraception. The study included 227 women, primarily housewives (68.7%) with low education levels (36.1% had informal education). Demographically, the study participants were economically disadvantaged, with 87.7% having incomes under \$600, a confounding factor that significantly associated with depression risk.

In addition, Alfaifi *et al.* [6] conducted a study on 904 women visiting primary healthcare centers in Saudi Arabia's Jazan province and revealed that most participants were married, aged 31.6 on average, and from low-income or low-education backgrounds, with 41.7% reporting limited social support. Also, Skovlund *et al.* [7] conducted a large cohort study of over 1 million women in Denmark, assessing the association between hormonal contraception and depression with a mean age of 24.4 years. Anderl *et al.* [15] examined the long-term impact of oral contraceptive use during adolescence on adult depression risk among 1,236 U.S. women and included a diverse sample with nearly half (45%) of participants having first used oral contraceptives in adolescence. Albawardi *et al.* [1] conducted a community-based study across all regions of Saudi Arabia, with a sample of 4,853 women aged 21-45 using either hormonal or non-hormonal contraception and showed a diverse sample, predominantly married and Saudi citizens, with most having received college education.

Regarding Hormonal Contraceptive Use Patterns, the most common contraceptive methods included combined oral contraceptives (COCs) and progesterone-only pills (POPs), with usage rates of 40.3% and 31.2%, respectively. Other methods like subdermal implants and injectables were less common, while hormonal patches and IUDs were the least used. Notably, most participants had used these methods for an extended period, with nearly half (49.3%) using them for 3-4 years, and a significant portion for up to 6 years.

Regarding Depression Prevalence and Severity, The PHQ-9 scale assessed depression levels, revealed that the prevalence of depression among women using hormonal contraceptives was 8.7% (95% CI: 7.3%–10.2%). The majority of participants exhibited normal or minimal depression (91.3%), while 7.3% experienced mild depression, 0.9% moderate depression, and only 0.5% suffered from moderate-to-severe depression. Also, non-oral contraceptives (such as implants and

injectables) are associated with higher depression rates (18-19%).

The prevalence of depression varied among studies. In agreement with our results, Anderl *et al.* [15] revealed that the prevalence of depression was assessed as a one-year prevalence of major depressive disorder (MDD), with 11% of participants meeting criteria for MDD within the past year. Moreover, Skovlund *et al.* [7] found that antidepressant usage was more common among hormonal contraceptive users, particularly with non-oral methods, particularly medroxyprogesterone acetate depot, carried an elevated depression risk (RR=2.7, CI: 2.45–2.87) compared to oral contraceptives. Similarly, Salad *et al.* [10] observed higher depressive symptoms among users of implants compared to pill users. This agreement across studies reinforces that non-oral contraceptives may have a more pronounced impact on mood, likely due to their different hormone release mechanisms and their longer-lasting, continuous effects on the body.

However, Albawardi *et al.* [1] reported that the prevalence of depression was notably high, with 29% experiencing moderate to severe depression. Salad *et al.* [10] recorded significantly higher rates, with 26.9% of participants experiencing moderate depression and 18.9% severe depression of Somali women as well as Alfaifi *et al.* [6], where approximately one-third of participants exhibited mood disturbances. These discrepancies could stem from regional differences in socioeconomic stability, access to healthcare, and cultural influences on mental health reporting. For instance, Salad *et al.* [10] sampled a population in Somalia with a high rate of poverty and limited mental healthcare access, likely exacerbating mental health symptoms. In contrast, our study was conducted in a hospital setting where participants may have had better healthcare access, potentially lowering the prevalence and severity of depression symptoms.

Regarding Association between Depression and Demographic Factors, our study identified several demographic factors associated with increased depression rates among women using hormonal contraceptives. Overweight and obese women had greater rates of depression (8.5% and 11.5%, respectively) than their lean counterparts, indicating that body mass index (BMI) was a major influence. This trend suggests a possible link between higher body weight and susceptibility to depression, potentially due to both biological factors and psychosocial aspects like body image.

In addition, Socioeconomic status also showed a notable association, as women from lower socioeconomic backgrounds had a higher prevalence of depression compared to those from moderate-income groups, likely reflecting the added mental strain of financial and social stressors. Additionally, women with social challenges, such as relationship or family issues, were more prone to depression (13.5%) than those without such difficulties (7.3%), indicating that social pressures may exacerbate the psychological impacts of hormonal contraceptive use.

Moreover, Chronic health conditions, especially diabetes, further intensified depression risk, with diabetic participants showing a much higher prevalence of depressive symptoms (27.1%) compared to non-diabetic women. These associations underscore the importance of considering a woman's BMI, socioeconomic context, social environment, and chronic health conditions when evaluating her mental health risks in relation to contraceptive use.

This correlation echoes findings from Salad *et al.* [10], who observed a high depression risk among low-income women, especially housewives with limited economic resources. Their study found housewives were nearly twice as likely to develop depression as employed women (Adjusted Odds Ratio [AOR] = 1.91, CI = 1.10–3.34,  $p=0.022$ ). Similarly, Alfaifi *et al.* [6] reported that factors like limited education, extended family settings, and low income were significantly associated with higher depression levels among contraceptive users ( $p=0.01$ ).

Regarding Hormonal Contraceptive Types and Depression, our study results revealed that depression was significantly lower among COC and POP users (4.5%), while rates were notably higher for users of subdermal implants, injectables, hormonal IUDs, and patches (around 18-19%,  $p<0.001$ ). The study's logistic regression analysis suggests that some contraceptive types might present a higher risk, with variations possibly due to the hormonal compositions and administration methods of these contraceptives.

This pattern aligns with Skovlund *et al.* [7], where non-oral contraceptives, including implants and injectables, showed a significantly elevated risk of antidepressant use. Skovlund *et al.* [7] further noted that the risk of antidepressant use was highest among medroxyprogesterone acetate depot users who had a relative risk (RR) of 2.7 (CI: 2.45–2.87) for antidepressant use, while oral contraceptive users had



lower risks (RR=1.2 for combined oral contraceptives). Salad *et al.* [10] reported similar findings, and showed a preference for long-acting methods, especially Jadelle implants, used by 43.6% of the participants. The study found that implant users were more likely to experience depression compared to those using oral contraceptives, with p-values of  $2.4 \times 10^{-2}$  for Jadelle and  $1.40 \times 10^{-2}$  for pills, suggesting a potential cumulative impact of prolonged hormone exposure on mood. Moreover, Alfaifi *et al.* [6] reported that types of contraception had a significant effect on depression, with a p-value of 0.01, indicating that hormonal spirals were more strongly associated with depression symptoms than other types.

The concordance across studies indicates that non-oral contraceptive methods may carry a heightened risk of depressive symptoms, which may be related to differences in hormonal composition, mode of action, or psychological factors associated with method choice.

Regarding Duration of Use and Depression Risk, our study results indicated that prolonged contraceptive use correlates with depression severity (p value < 0.001). Women who had used hormonal contraceptives for 5-6 years or more than 7 years showed progressively higher rates of depression (37.7%, p < 0.001). Logistic regression confirmed that the likelihood of depression increased substantially with longer usage durations, with an odds ratio significantly higher for those using contraceptives for more than 7 years.

Duration of contraceptive use also emerged as a key variable in depression risk. Skovlund *et al.* [7] reported similar trends, with depression risk peaking at six months and gradually declining with prolonged use. Moreover, Alfaifi *et al.* [6] reported longer durations of hormonal contraceptive use correlated with greater mood disturbances.

On the contrary, Salad *et al.* [10], however, observed that shorter-term use was more associated with depressive symptoms, while prolonged use for over one year showed reduced depression risks, suggesting a potential adaptation effect which is also reported by Albawardi *et al.* [1]. This discrepancy could be influenced by sample size included, regional factors such as healthcare accessibility and social support, potentially providing long-term users with coping mechanisms. The varied findings suggest that duration-related depression risks may be context-dependent, emphasizing the importance of ongoing mental health

evaluations for long-term contraceptive users to mitigate potential cumulative effects.

Regarding Independent Factors for Depression Risk, Logistic regression identified independent variables significantly impacting depression risk. High BMI, low socioeconomic status, presence of diabetes, and specific contraceptive types (especially subdermal implants and injectables) were significant risk factors. Furthermore, the duration of contraceptive use was a critical factor, particularly for durations exceeding 5 years.

In concordance with our findings, Salad *et al.* [10] found similar independent predictors of depression risk, including low income and housewife status, where housewives had a 1.91 times higher risk of depression than employed women. Alfaifi *et al.* [6] reported that independent predictors of depression included low income, low social support, and poor marital relationships. Skovlund *et al.* [7], noted socioeconomic status as a critical predictor, with higher rates of antidepressant use among lower-income women.

Furthermore, Albawardi *et al.* [1] reported that independent risk factors for depression included psychiatric history, chronic medical conditions, substance use, and depressogenic medications, suggesting a multifactorial influence on mental health among contraceptive users.

Ultimately, this study provided essential insights into how specific demographic and contraceptive-related factors interact with depression risk, highlighting the complexity of mental health considerations in hormonal contraceptive users. The findings underscore the importance of considering socioeconomic and health backgrounds in understanding and managing potential mental health impacts of contraceptive choices.

### Strengths of the Study

The study boasts several strengths, primarily its robust sample size and hospital-based design, which enable a focused examination of the prevalence and severity of depression among hormonal contraceptive users in a clinical setting. By conducting the study in an outpatient gynecological clinic, researchers gained access to a diverse patient pool actively seeking reproductive health services, making the findings more applicable to women within this demographic. Additionally, the use of the PHQ-9 scale for depression assessment ensures a reliable measure of mental health, adding credibility to the results. Moreover, the

comprehensive demographic and contraceptive data collected allow for a thorough investigation of how various factors, such as BMI, socioeconomic status, and contraceptive type, influence depression risk.

## LIMITATIONS

Despite its strengths, the study also has some limitations. First, the cross-sectional design restricts causal inference, as it only captures data at a single point in time. This limitation makes it difficult to conclude definitively that hormonal contraceptives cause depression, as other unmeasured variables or pre-existing conditions could influence mental health outcomes. Additionally, the study relies on self-reported data for certain variables, such as social problems and prior health conditions, which may introduce recall bias. The study's hospital setting may also limit the generalizability of the findings to the broader population, as patients in clinical settings may have different health profiles or stressors than those who do not seek regular reproductive health services. Lastly, cultural and regional factors unique to Saudi Arabia might also limit the applicability of these findings to other settings with different sociocultural dynamics around contraception and mental health.

## CONCLUSION

This study highlights the critical need for healthcare providers to integrate mental health considerations into contraceptive counseling and follow-up care. Given the observed associations between certain hormonal contraceptives, prolonged use, and elevated depression rates, clinicians should adopt a proactive approach in assessing patients' mental well-being, especially for women with additional risk factors like high BMI, socioeconomic challenges, or chronic conditions such as diabetes. Screening tools like the PHQ-9 should be routinely used during consultations to monitor for early signs of depression, allowing for timely intervention if needed. Additionally, when advising on contraceptive methods, clinicians may prioritize options associated with lower depressive outcomes, such as combined oral contraceptives and progesterone-only pills, for women expressing mental health concerns or at higher risk. By incorporating these insights, healthcare providers can enhance contraceptive care's quality, balancing both reproductive and mental health outcomes to foster overall well-being among patients.

## AUTHOR CONTRIBUTIONS

Every author contributed significantly to the work reported, whether it was in the idea, study design, execution, data collection, analysis, and interpretation, or all of these areas; they all participated in the article's drafting, revision, or critical review; they all agreed on the journal to which the article was submitted; and they all agreed to take responsibility for every part of the work.

## CONFLICTS OF INTEREST

There are no disclosed conflicts of interest for the authors.

## CONFIDENTIALITY OF DATA

The authors affirm that they have complied with their work center's guidelines on the release of patient data.

## PROTECTION OF HUMAN AND ANIMAL SUBJECTS

The authors affirm that the methods used were compliant with the World Medical Association's Code of Ethics (Declaration of Helsinki) and the rules of the applicable clinical research ethics committee.

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## FINANCIAL RELATIONSHIPS

Every author has disclosed that they have no financial ties to any groups that could be interested in the work they have contributed, either now or in the last three years.

## OTHER RELATIONSHIPS

No additional affiliations or activities that could seem to have impacted the submitted work have been disclosed by any of the authors.

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