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Original Article

Prevalence and Predictors of Depression and Anxiety among Women Using Hormonal and Non-Hormonal Contraceptives: A Comparative Cross-Sectional Study

Mohi Ud Din[1*], Muhammad Umar[2], Alia Liaqat[3], Nadia Zulfiqar[4], Binash Irfan[5] and Laiba Ali[5]

[1]Department of Community Medicine, Aziz Fatima Medical and Dental College, Faisalabad, Pakistan
[2]Department of Obstetrics and Gynecology, James Paget University Hospital, United Kingdom
[3]Department of Obstetrics and Gynecology, Allied Hospital, Faisalabad, Pakistan
[4]Department of Obstetrics and Gynecology, Aziz Fatima Medical and Dental College, Faisalabad, Pakistan
[5]Aziz Fatima Medical and Dental College, Faisalabad, Pakistan

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***Corresponding Author:**
Mohi Ud Din
Department of Community Medicine, Aziz Fatima Medical and Dental College, Faisalabad, Pakistan
dr.md89@outlook.com

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ABSTRACT

There is still debate over the psychological effects of hormonal contraceptives, and there is little data from low-resource countries like Pakistan. **Objectives:** To assess the prevalence and predictors of depression and anxiety among women using hormonal and non-hormonal contraceptives. **Methods:** A comparative cross-sectional study was carried out at the Department of Obstetrics and Gynecology, Aziz Fatimah Hospital, Faisalabad, from May to September 2025. A total of 376 women were recruited through non-probability consecutive sampling. Data were collected using a pre-developed questionnaire, which included sociodemographic characteristics, obstetric history, and the PHQ-9 and GAD-7 scales. Associations were examined by chi-square tests, and multiple logistic regression was applied to identify independent predictors. **Results:** The rates of clinically significant depression and anxiety were found to be 68.1% and 70.7%, respectively. Both conditions were strongly linked to contraceptive method ($p<0.001$), with combined oral contraceptive users presenting the highest rates (83.0% for both) and implant users the lowest (27.7% and 21.7%). Regression analysis showed that being employed was a protective factor for depression (AOR = 0.50). After controlling for sociodemographic variables, hormonal contraceptives were not an independent predictor of depression; nevertheless, the best predictor of anxiety (AOR = 2.92) was medical reasons for using contraceptives. **Conclusions:** Women using hormonal contraceptives, particularly combined oral and injectables, had increased rates of anxiety and depression. Following the adjustment, there was no independent correlation between the usage of contraceptives and depression. The most significant psychological risk factors were higher parity, unemployment, and medical reasons for using contraceptives.

INTRODUCTION

Contraception is an essential medical procedure for the maintenance of women's reproductive and sexual health since it allows the planning of pregnancies and, thus, the avoidance of unwanted conceptions [1]. Modern contraceptive methods are being used by around 851 million women globally, and the number is projected to grow as the availability of reproductive health services expands [2]. Even though contraception is widely used, the psychological effects of different methods, notably the hormonal types, are still a matter of debate. One of the main causes of disability worldwide is depression, and it affects women almost twice as much as men, which is partly the result of biological and hormonal factors [3]. Among the hormonal contraceptives, it may have an impact on the neurotransmitter serotonin, which is responsible for mood and emotional stability, as a result of the changes in the

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estrogen and progesterone levels [4]. Although certain studies have connected the use of hormonal contraceptives with the development of depressive symptoms, others have determined there to be no correlation [5]. Thus, this changeability keeps on being a problem for doctors who prescribe contraceptives, and it also adds to the confusion among the patients. Mood disturbances, including depression and mood lability, are among the most common reasons cited for discontinuing hormonal contraceptives, with studies reporting that up to 33.9% of women attribute their discontinuation to mood-related side effects [6]. Mood disturbances related to the application of hormonal contraceptives are also among the most common reasons for their discontinuation [7]. Additionally, hormone use is sometimes accentuated by social and media influences, and this fear towards hormonal methods might eventually lead to their rejection or discontinuation even in cases where no side effects are reported [8]. In Pakistan, the contraceptive prevalence rate (CPR) among married women is roughly 34%, with 25% relying on modern methods [9]. The increasing utilization of hormonal contraceptive methods and the sociocultural context that could affect mental well-being and contraceptive selections make it necessary to investigate this relationship.

However, the mental health impact of different contraceptive methods in this population remains largely unexplored. This study aimed to find out the difference in the rates of clinically significant depression and anxiety among hormonal and non-hormonal contraceptive users, and to study their prevalence according to specific contraceptive methods (for example, combined oral contraceptives, injectables, implants. Also, to identify the independent sociodemographic and obstetric predictors of depression and anxiety among contraceptive users.

METHODS

A comparative cross-sectional study was undertaken at the Department of Obstetrics and Gynecology, Aziz Fatimah Hospital, Faisalabad, which is a tertiary care teaching hospital in Faisalabad, Pakistan. Data collection was performed from May to September 2025. The Institutional Ethics Committee of Aziz Fatimah Hospital approved the study with the Ref. No: IEC/387-25 dated 6th May 2025. The study was first introduced, its procedures explained, and then the potential risks and benefits disclosed to each one who was a potential participant. Each patient who showed interest in participating was given a written informed consent form to fill in. To maintain confidentiality, all the data obtained was assigned numbers to represent the individuals, and they were then securely stored. This cross-sectional design was employed to assess the prevalence and associations between contraceptive use and mental health symptoms, but it cannot establish causality due to the inability to determine temporal relationships between exposure and outcome. The sample size was calculated using the two-proportion formula for comparative studies to detect a clinically meaningful difference in depression prevalence between hormonal and non-hormonal contraceptive users, with 80% power and 95% confidence level. [10]. The result was a minimum sample size of 376 participants required in total. This sample was then split into two equal parts: one part of 188 women utilizing hormonal contraceptives, and the other 188 women employing non-hormonal methods. The hormone contraceptive users were divided into specific groups based on their chosen contraceptive methods, which included combined oral contraceptives (n=53), injectables (n=39), subcutaneous implants (n=83), intrauterine devices (n=8), and vaginal rings (n=5). Although these methods were categorized separately for descriptive analysis, they were combined into a single hormonal group for the primary regression analysis due to the limited sample size within individual method categories. The study assessed the prevalence of clinically important depression and anxiety disorders across these individual categories, while it primarily compared hormonal treatments to non-hormonal treatments. A consecutive sampling approach was employed to enroll all eligible women attending the gynecology outpatient clinic of a single tertiary care hospital, which may limit generalizability to the broader population. Women aged between 18 and 45 years who were using hormonal or non-hormonal contraceptives and came to the gynecology outpatient clinic were invited to take part in the study. The exclusion criteria were pregnant or nursing mothers and those with diagnosed psychiatric disorders before the study. Women with pre-existing psychiatric conditions were excluded based on verification through medical record review and self-reported history of diagnosed psychiatric disorders on a structured intake questionnaire. The study did not collect data on participants' history of depression or anxiety prior to contraceptive initiation, which represents a critical unmeasured confounder in the analysis. Recruitment of participants exclusively from gynecology outpatient clinics may introduce selection bias, as these women may already have concerns about their contraceptive methods or underlying gynecological conditions that could influence their mental health symptoms. Hormonal contraceptive techniques were classified into combined oral contraceptives, injections, subdermal implants, hormonal intrauterine devices (IUDs), transdermal patches, and vaginal rings. Copper IUDs, spermicidal agents, cervical caps, and surgical sterilization (tubal ligation) were included in the non-hormonal methods category. A pre-

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designed, structured, and previously tested questionnaire was the main data collection tool [11]. The Patient Health Questionnaire-9 (PHQ-9) was used to assess depression. The PHQ-9 is a widely validated instrument that scores each of the nine DSM-IV criteria for depression on a scale from 0 (not at all) to 3 (nearly every day), providing a total score ranging from 0 to 27. Based on established cut-offs, scores were categorized as follows: 0-4 (minimal depression), 5-9 (mild depression), 10-14 (moderate depression), 15-19 (moderately severe depression), and 20-27 (severe depression). A cut-off score of ≥10 was used to indicate clinically significant depression, as this threshold has demonstrated optimal sensitivity (88%) and specificity (88%) for detecting major depressive disorder [12]. The Urdu version of the PHQ-9 has been validated across multiple Pakistani populations with excellent psychometric properties (Cronbach's alpha = 0.83-0.91), including community-based pregnant women and adolescent populations [13]. The Generalized Anxiety Disorder-7 (GAD-7) scale was used to assess anxiety symptoms. The GAD-7 consists of seven items, each scored from 0 (not at all) to 3 (nearly every day), with total scores ranging from 0 to 21. Scores were categorized as: 0-4 (minimal anxiety), 5-9 (mild anxiety), 10-14 (moderate anxiety), and 15-21 (severe anxiety). A cut-off score of ≥10 was used to indicate clinically significant anxiety, as this threshold provides optimal sensitivity (89%) and specificity (82%) for detecting generalized anxiety disorder [14]. The Urdu version of the GAD-7 has been validated in Pakistan, demonstrating excellent reliability (Cronbach's alpha = 0.92) and good convergent validity [15]. The questionnaire was administered through face-to-face interviews by the trained data collectors to ensure that the tool was accessible even to people with low levels of education. However, this method may introduce social desirability bias, particularly when responding to sensitive questions about mental health symptoms. The questionnaire had a total of four sections: sociodemographic information, obstetric and gynecological history, the PHQ-9, and the GAD-7 scale.

The data were performed by IBM SPSS Statistics Version 25.0. Frequencies and percentages were used to summarize categorical variables. The Chi-square test was used to evaluate the relationship between the type of contraceptive method and the occurrence of depression and anxiety. Subsequently, two independent multiple logistic regression analyses were done to find out the predictors of clinically significant depression (PHQ-9 ≥10) and anxiety (GAD-7 ≥10) separately. In the regression analysis, the 'type of contraceptive' variable, that is, the primary exposure variable, was treated as a binary variable (non-hormonal = 0, Hormonal = 1). The regression results are given as Adjusted Odds Ratios (AORs) with 95% Confidence Intervals (CIs). A p-value of less than 0.05 was used as a threshold for statistical significance in all analyses.

RESULTS

This research involved a total of 376 women, with 188 (50.0%) using hormonal contraceptives and the other half non-hormonal. The women were mostly aged 31-35 years (35.9%), living in urban areas (66.0%), and were married (95.7%). A large number were unemployed (66.8%) and had three or more children (48.7%). The characteristics of the participants, both sociodemographic and obstetric, are given in table 1.

Table 1: Sociodemographic and Obstetric Characteristics of Participants (n=376)

Variables	Category	n (%)
Age (years)	18–25	39 (10.4%)
	26–30	97 (25.8%)
	31–35	135 (35.9%)
	>35	105 (27.9%)
Residence	Urban	248 (66.0%)
	Rural	128 (34.0%)
Marital Status	Married	360 (95.7%)
	Unmarried / Separated / Widowed	16 (4.3%)
Education	Illiterate	52 (13.8%)
	Primary	35 (9.3%)
	Secondary	80 (21.3%)
	Higher secondary	109 (29.0%)
	Graduation or above	100 (26.6%)
Employment Status	Employed	125 (33.2%)
	Unemployed	251 (66.8%)
Monthly Income	Low	65 (17.3%)
	Middle	268 (71.3%)
	High	43 (11.4%)
Number of Children	None or 1	84 (22.3%)
	2	109 (29.0%)
	≥3	183 (48.7%)
History of Abortion	Yes	165 (43.9%)
	No	211 (56.1%)
Type of Contraceptive Used	Non-hormonal	188 (50.0%)
	Hormonal (Total)	188 (50.0%)
Hormonal Methods	Subcutaneous Implant	83 (44.1%)
	Combined Oral Contraceptives	53 (28.2%)
	Injectables	39 (20.7%)
	Others	13 (6.9%)

Based on the GAD-7 scores, the majority of participants had mild anxiety (171, 45.5%), followed by minimal anxiety (110, 29.3%) and moderate anxiety (86, 22.9%). According to the PHQ-9, mild depression was most common (153, 40.7%), while 120 women (31.9%) had minimal depressive symptoms. Using a cut-off score of ≥10 to indicate clinically

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significant symptoms, 256 (68.1%) for depression, and 266 women (70.7%) screened positive for anxiety. The observed prevalence of clinically significant depression (68.1%) and anxiety (70.7%) is substantially higher than general population estimates, which may reflect the hospital-based sampling approach, the use of a cut-off score of ≥10 that may not be optimally calibrated for this population, or a true elevated burden of mental health symptoms among contraceptive users in this setting. The prevalence of both depression and anxiety differed significantly across specific contraceptive methods ($p < 0.001$ for both). The highest rates were among users of combined oral contraceptives (Depression: 83.0%; Anxiety: 83.0%) and injectables (Depression: 82.1%; Anxiety: 84.6%). On the other hand, users of subcutaneous implants had the lowest rates (Depression: 27.7%; Anxiety: 21.7%). Moreover, a huge number of women using non-hormonal methods also tested positive for depression (79.8%) and anxiety (85.6%), as shown in table 2.

Table 2: Association between Contraceptive Method and Depression (PHQ-9 ≥10) and Anxiety (GAD-7 ≥10) among Study Participants (n=376)

Contraceptive Methods	Total, n	Depression, n (Group Prevalence %)	No Depression, n (Group Prevalence %)	p-value	Anxiety, n (Group Prevalence %)	No Anxiety, n (Group Prevalence %)	p-value
Non-Hormonal Methods	188	150 (79.8%)	38 (20.2%)	<0.001	161 (85.6%)	27 (14.4%)	<0.001
Hormonal Methods	188	106 (56.4%)	82 (43.6%)		105 (55.9%)	83 (44.1%)	
Combined Oral Contraceptives	53	44 (83.0%)	9 (17.0%)		44 (83.0%)	9 (17.0%)	
Injectables	39	32 (82.1%)	7 (17.9%)		33 (84.6%)	6 (15.4%)	
Subcutaneous Implants	83	23 (27.7%)	60 (72.3%)		18 (21.7%)	65 (78.3%)	
Intrauterine Devices	8	5 (62.5%)	3 (37.5%)		7 (87.5%)	1 (12.5%)	
Vaginal Rings	5	2 (40.0%)	3 (60.0%)		3 (60.0%)	2 (40.0%)	
Overall Total	376	256 (68.1%)	120 (31.9%)		266 (70.7%)	110 (29.3%)	

Notably, the non-hormonal group paradoxically showed higher crude rates of depression (79.8%) and anxiety (85.6%) compared to the hormonal group (56.4% and 55.9%), suggesting that the unadjusted association is confounded by sociodemographic and obstetric factors

A multiple logistic regression was performed to identify independent predictors of clinically significant depression (PHQ-9 ≥10), adjusting for all variables in table 1. The model identified two significant independent predictors. Employment status was a protective factor, with employed women having 50% lower odds of depression compared to unemployed women (AOR = 0.50, 95% CI [0.35, 0.72], p<0.001). Conversely, the number of children was a risk factor, with each additional child associated with a 56% increase in the odds of depression (AOR = 1.56, 95% CI [1.14, 2.13], p=0.050). The type of contraceptive (hormonal vs. non-hormonal) was not a statistically significant independent predictor after adjustment for confounders (AOR = 1.19, 95% CI [0.99, 1.42], p=0.062). Hormonal contraceptive use did not show any significant impact on depression after researchers controlled for both employment status and number of children. It indicates that people who use hormonal methods show higher rates of depression because sociodemographic factors explain their condition rather than hormonal exposure itself, as shown in table 3.

Table 3: Multiple Logistic Regression Analysis of Factors Associated with Depression (PHQ-9 ≥10) among Women Using Contraception (n=376)

Factors	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p-value
Sociodemographic Factors			
Age (Per Category Increase)	1.05	0.80 - 1.38	0.742
Educational Status (Per Category Increase)	0.80	0.64 - 1.01	0.062
Marital Status (Ref: Married)	5.23	0.41 - 66.70	0.203
Residence (Ref: Urban)	1.04	0.59 - 1.86	0.884
Monthly Income (Per Category Increase)	1.61	0.91 - 2.86	0.105
Occupational Status			
Unemployed	0.50	0.35 - 0.72	<0.001*
Contraceptive-Related Factors			
Type of Contraceptive (Ref: Non-hormonal)	1.19	0.99 - 1.42	0.062
Number of Children			
Ref: Per Child	1.56	1.14 - 2.13	0.005*
Others			
History of Abortion (Ref: No)	0.79	0.54 - 1.15	0.216
Time Since Delivery (Per Category Increase)	0.62	0.30 - 1.29	0.200
Reason for Use (Ref:Contraception Only)	1.54	0.93 - 2.56	0.096
Duration of Use (Per Category Increase)	0.88	0.65 - 1.21	0.441

A separate multiple logistic regression for anxiety (GAD-7 ≥10) identified three independent predictors. Using hormonal contraceptives was associated with a 37% increase in the odds of anxiety compared to using non-hormonal methods (AOR = 1.37, 95% CI [1.13, 1.64], p=0.001). Each additional child increased the odds of anxiety by 57% (AOR = 1.57, 95% CI [1.14, 2.17], p=0.006). The most substantial predictor was the reason for contraceptive use; using contraceptives for reasons other than pure contraception (e.g., menstrual disorders, PCOS) was associated with nearly three times higher odds of anxiety (AOR = 2.92, 95% CI [1.45, 5.91], p=0.003), as shown in table 4.

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Table 4: Multivariable Logistic Regression Analysis of Factors Associated with Anxiety Symptoms (GAD-7 ≥10) among Women Using Contraception (n=376)

Factors	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p-value
Sociodemographic Factors			
Age (Per Category Increase)	0.99	0.74 – 1.32	0.947
Educational Status (Per Category Increase)	0.93	0.74 – 1.18	0.561
Marital Status (Ref: Married)	0.42	0.04 – 4.33	0.466
Residence (Ref: Urban)	1.60	0.87 – 2.94	0.130
Monthly Income (Per Category Increase)	1.20	0.66 – 2.16	0.554
Occupational Status (Ref: Unemployed)	0.73	0.50 – 1.07	0.105
Contraceptive-Related Factors			
Type of Contraceptive (Ref: Non-hormonal)	1.37	1.13 – 1.64	0.001*
Number of Children (Per Child)	1.57	1.14 – 2.17	0.006*
History of Abortion (Ref: No)	0.78	0.52 – 1.16	0.221
Time Since Last Delivery (Per Category Increase)	0.48	0.21 – 1.11	0.086
Reason for Use (Ref: Contraception Only)	2.92	1.45 – 5.91	0.003*
Duration of Contraceptive Use (Per Category Increase)	0.78	0.56 – 1.08	0.139

Note: Ref = Reference category. AOR = Adjusted Odds Ratio

DISCUSSION

The current research adds to the changing evidence on the connection between contraceptive use and psychological well-being by measuring depression and anxiety in women utilizing different methods, i.e., hormonal and non-hormonal methods. The results correspond to a larger research base that supports the claims about hormonal contraceptive (HC) use affecting mood symptoms. A cohort study reported that initiation of hormonal contraception (HC) in the postpartum period was associated with an increased risk of depressive symptoms, with an adjusted hazard ratio of 1.49 (95% CI: 1.42–1.56) compared with non-use [16]. Method-specific differences seen in the current study concur with the findings that some methods—like hormonal IUDs, implants, and patches are associated with different mood-related risk profiles [17]. The paradoxical finding of higher depression and anxiety rates among non-hormonal users in crude analysis underscores the importance of multivariable adjustment, as hormonal contraceptive use was not an independent predictor of depression after controlling for confounders (AOR = 1.19, p = 0.062), indicating that the higher rates in non-hormonal users are likely explained by sociodemographic and obstetric factors rather than hormonal exposure itself. Data from the UK Biobank on a larger scale by Johansson *et al.* also point out that the use of oral contraceptives (OC) might slightly increase the risk of depression over a lifetime, especially in the first two years after starting, with a hazard ratio of 1.71 (95% CI 1.55-1.88) during the initial two years of use. Though, these findings are from a population-based cohort in the UK and may not be directly generalizable to the Pakistani population due to differences in demographic, cultural, and healthcare contexts. [18]. However, the contrary was true when a larger family size was concerned; it was a strong predictor of both depression and anxiety, which is in agreement with Ethiopian research that reveals that the dual caregiving burden and lack of social support led to psychological distress among users of injectable hormonal contraception [19]. Thus, these findings advocate for the necessity of considering the social determinants as part of the reproductive health evaluations, especially in low-resource areas. The finding of high levels of depression and anxiety among non-hormonal contraceptive users in this study implies that psychological distress is not necessarily connected to hormonal exposure only. A scoping review by Luthuli *et al.* highlighted the complex, bidirectional relationship between mental health and contraceptive choices, with studies showing variable associations between mental health disorders and hormonal contraceptive use [20]. Such variability makes it clear that there is a very different contextual and cultural issue in how contraception relates to emotional well-being. Moreover, recent studies from the Middle East have corroborated this complexity. The study in Saudi Arabia by Khormi found that different contraceptive methods lead to different depression rates, which reached their highest levels among users of subdermal implants, injectables, and hormonal IUDs. The study showed that method-specific counseling needs to continue because different contraceptive methods produce different outcomes for users [21]. This finding contradicts our observation that implant users had the lowest depression rates (27.7%), which may be explained by differences in study populations, cultural contexts, duration of use, or the timing of mental health assessment relative to contraceptive initiation. The research, which examined sociocultural factors in Iran, found that contraceptive use patterns are affected by multiple sociocultural elements, while middle-aged Iranian women continue to use oral contraceptives because cultural norms permit them to access the medication without a prescription [22]. These results are consistent with the current study, where the contraceptive method and the period of use were found to have a significant correlation with anxiety symptoms. Moreover, new neuroendocrine studies are coming forth and shedding light on the hormonal mechanisms. The research conducted by Karaviti *et al.* used the Swedish Mom2B cohort to follow mood changes in women. The odds

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ratios showed a range from 1.30 to 2.07 across different time points, pointing towards the women who were highly sensitive to hormonal fluctuations as the ones experiencing greater mood instability [23]. These results and those from worldwide studies presented above are mixed, but they argue that the relationship between contraception and mental health is complex, i.e., influenced by hormonal exposure, sociodemographic conditions, reproductive roles, past psychological weaknesses, and cultural expectations. These results point to the urgent need for context-specific advice, routine mental health checks along with family planning services, and longitudinal research involving multiple centers to more effectively evaluate causality across different contraceptive methods. Also, the study used a single population proportion formula for sample size determination instead of a two-group comparison formula, which resulted in reduced power to detect contraceptive group differences.

The use of a single population proportion formula instead of a two-group comparison formula for sample size calculation may have reduced the statistical power to detect significant between-group differences.The cross-sectional nature of this study precludes establishing a causal relationship between contraceptive use and depression/anxiety, as the temporal sequence of exposure and outcome could not be determined. The reliance on medical records and self-report for excluding pre-existing psychiatric conditions may have led to misclassification, as undiagnosed or unreported psychiatric disorders could not be ruled out. The use of face-to-face interviews may have led to social desirability bias, with participants potentially underreporting or overreporting mental health symptoms due to stigma or perceived judgment. The aggregation of diverse hormonal contraceptive methods with different hormonal formulations into a single group for primary analysis may have obscured method-specific differences in depression and anxiety risk. The absence of data on pre-existing depression or anxiety before contraceptive initiation is a major limitation, as it precludes controlling for this critical confounding factor in the association between contraceptive use and mental health outcomes. The recruitment of participants from gynecology outpatient clinics may have introduced selection bias, as women attending such clinics might already have method-related concerns or underlying reproductive health issues that could affect their psychological well-being. The high prevalence of depression (68.1%) and anxiety (70.7%) may reflect selection bias from hospital-based recruitment, potential overestimation due to an unvalidated cut-off of ≥10 in this population, and the cross-sectional design's inability to establish temporality, necessitating future community-based studies with population-specific validation. Future comparative studies should employ appropriate sample size calculations based on expected between-group differences.

CONCLUSIONS

Women using hormonal contraceptives showed a high burden of depressive and anxiety symptoms, particularly those using combined oral and injectable methods. However, after adjusting for confounders, hormonal contraceptive use was not independently associated with depression. Employment status appears to be a protective factor, while having more children is associated with higher psychological risk. Using contraceptives for medical conditions like PCOS or menstrual abnormalities was the biggest risk factor for anxiety. The study results show that mental health screenings in family planning services need to assess socioeconomic factors together with existing health conditions instead of evaluating only birth control methods.

Authors' Contribution

Conceptualization: MU, AL, NZ
Methodology: MUD, MU, AL, NZ, BI, LA
Formal analysis: BI, LA
Writing and Drafting: MU, AL, NZ, BI, LA
Review and Editing: MUD, MU, AL, NZ, BI, LA

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflict of Interest

All the authors declare no conflict of interest.

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