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A LITERATURE REVIEW: THE IMPACT OF HORMONAL CONTRACEPTIVE USE ON DEPRESSION AND ANXIETY DISORDERS AMONG WOMEN

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ABSTRACT
Hormonal contraceptive use is widely recognized as an essential aspect of women's reproductive health, but its potential psychological effects, particularly related to depression and anxiety, have received less attention. This literature review aims to examine the association between hormonal contraceptive use and the risk of depression and anxiety in women. A comprehensive analysis of studies published in peer-reviewed journals was conducted, focusing on studies that assess mental health outcomes about hormonal contraceptive use. The review reveals a significant association between hormonal contraceptive use and an increased risk of depression, while the impact on anxiety levels remains inconsistent across studies. Specific demographic groups, such as adolescents and women with pre-existing mental health conditions, are found to be particularly vulnerable. These findings highlight the need for improved mental health screening in contraceptive counselling and the importance of further research into the mental health implications of hormonal contraception. This review contributes to the understanding of how hormonal contraceptives may affect women's mental health, providing valuable insights for healthcare providers, policymakers, and future research directions.

Keywords: Anxiety; Depression; Hormonal contraceptive; Women

INTRODUCTION

Contraceptive use is a cornerstone of women's reproductive health. (Downey et al., 2017), offering them the autonomy to plan pregnancies, improve their overall health, and enhance their socioeconomic status (Frost & Lindberg, 2013). By enabling women to make decisions about when and how to have children, contraception creates opportunities for personal, professional, and educational growth (Erfani, 2015; Finlay & Lee, 2018). This control over reproductive health allows women to better allocate their time and resources toward other priorities, including career advancement and personal well-being. (Albawardi et al., 2022). In turn, these benefits contribute positively to family stability and the broader community, reducing the socioeconomic challenges that can arise from unplanned pregnancies. (Alano & Hanson, 2018).

At a societal level, contraception has far-reaching benefits that extend beyond individual health. It significantly addresses issues such as overpopulation, which can strain resources like healthcare, education, and the environment. (Freedman, 2014). Effective family planning policies can help alleviate these pressures, improve economic conditions, and ensure that resources are available to support families more effectively. The WHO reported in 2021 that over 874 million people were using modern contraceptive methods, with Indonesia being one of the leading countries promoting family planning. Through programs led by the National Population and Family Planning Board (BKKBN), Indonesia has made significant strides, with over 60% of married women of reproductive age using contraception as of 2023, with nearly 37% of them using hormonal contraception. (BKKBN, 2023).

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Contraceptive methods can generally be divided into hormonal and non-hormonal types. Non-hormonal methods that do not involve altering hormone levels in the body include options like condoms, copper intrauterine devices (IUDs), natural family planning methods, and sterilization procedures. In contrast, hormonal contraceptives, such as oral contraceptive pills (OCPs), implants, injectables, and hormonal IUDs, work by regulating or inhibiting natural hormonal processes to prevent pregnancy. (Howard & Benhabbour, 2023). The method choice often depends on various factors, including health conditions, convenience, and personal preference. (Brant et al., 2022). While hormonal contraceptives are highly effective at preventing pregnancy, their potential psychological effects have not been as thoroughly studied.

Despite the benefits of contraceptive methods, the potential side effects of hormonal contraceptives, especially related to mental health, have raised concerns among health providers and reproductive women who are contraceptive users. Recent studies have raised concerns about the mental health correlation of hormonal contraceptive use. (Jahanfar et al., 2024). Some research suggests that hormonal methods may be linked to mental health changes, including an increased risk of mood disorders such as depression and anxiety among women of reproductive age. (Noachtar et al., 2023). Depression and anxiety are among the most prevalent mental health issues worldwide. (WHO, 2017). According to the 2023 Indonesia Health Survey, 1.8% of women nationwide experienced depression, indicating that nearly 2 out of 100 women in Indonesia face this mental health issue.

In Indonesia, the prevalence of anxiety disorders among women is reported to be 5.6% (IHME & Global Burden of Disease, 2021). Depression remains a leading cause of disability, affecting millions of people every year. At the same time, anxiety disorders are equally prevalent, characterized by excessive worry, fear, and physical symptoms such as rapid heartbeat and sweating. (Fekadu et al., 2017). These conditions disproportionately affect women due to biological, psychological, and social factors, including age, socioeconomic status, and pre-existing health conditions. (Bhatia & Goyal, 2020; Otten et al., 2021). Given these gender disparities in mental health, it is important to raise questions about whether hormonal contraceptives could exacerbate these risks, particularly for vulnerable populations.

Addressing this gap is essential to understanding how these contraceptives might influence mental health outcomes, particularly depression and anxiety. Moreover, understanding the correlation between hormonal contraceptive methods and mental health has critical consequences on personalized contraceptive counselling and informed consent decision-making. By clarifying these associations, healthcare providers and policymakers can better guide women in making informed decisions about contraceptive use, considering both physical and mental well-being.

Thus, this study aims to explore existing literature on the potential links between hormonal contraceptive use and mental health outcomes, with a specific focus on depression and anxiety. By synthesizing current evidence, this research aims to provide evidence-based insights that empower women to make informed decisions about their reproductive health while enabling healthcare providers to tailor their recommendations to mitigate potential mental health risks.

METHOD

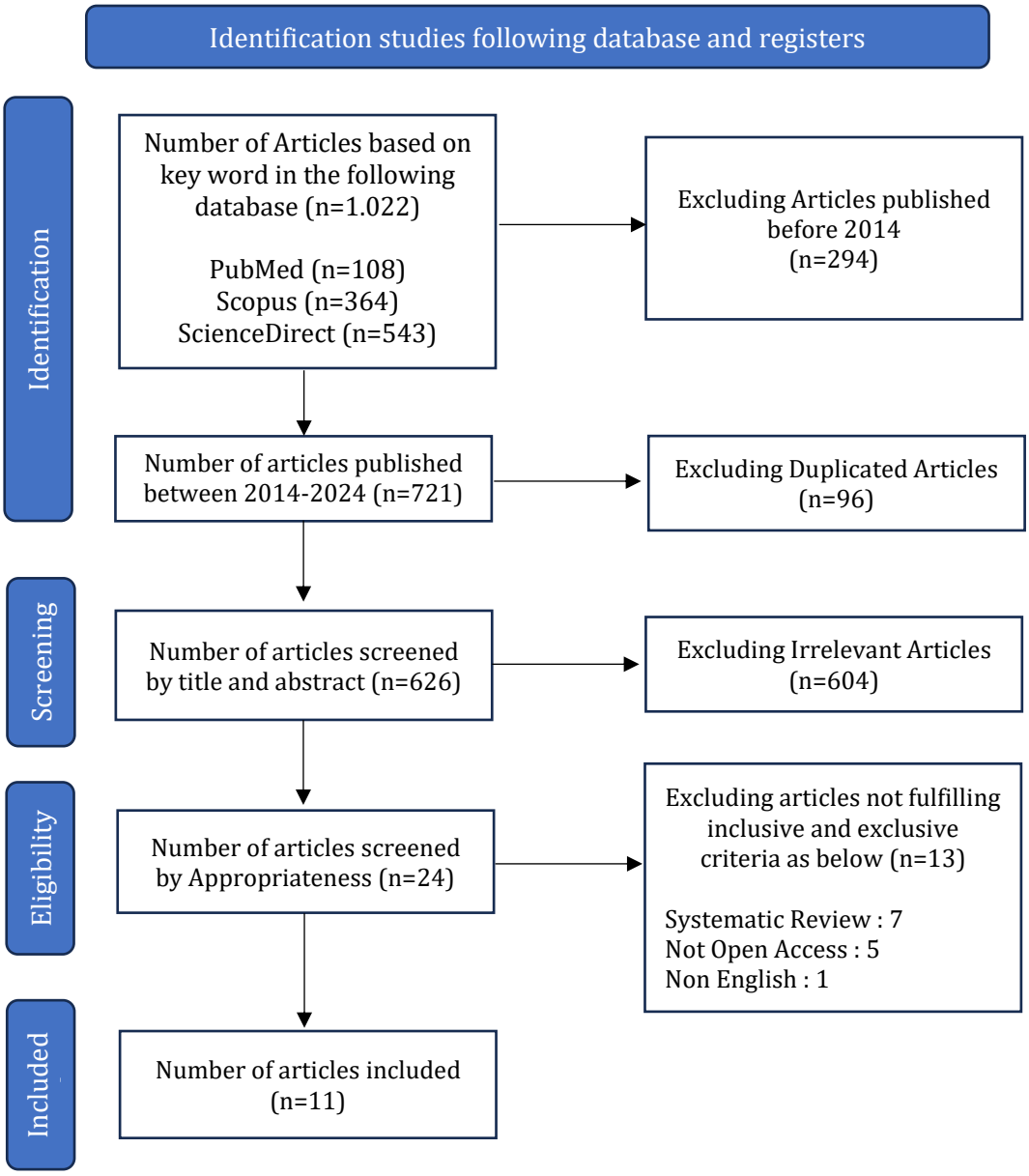
This literature review follows a structured approach to ensure comprehensive coverage and an apparent synthesis of relevant studies. The PICO framework guided the eligibility criteria, focusing on the population, intervention, comparison, and outcomes pertinent to the research question. The population considered was women of reproductive age (15–49 years), while the intervention examined was hormonal contraceptive use, including oral contraceptive pills, injectables, implants, and hormonal IUDs. The comparison group comprised women who either did not use hormonal contraceptives or relied on non-hormonal methods. The outcomes of

interest were the prevalence and severity of depression and anxiety. Studies included were peer-reviewed articles published in English between 2014 and 2024, providing full-text access and discussing depression and anxiety outcomes in the context of hormonal contraceptive use. Exclusion criteria encompassed conference proceedings, abstracts only, systematic reviews, and articles that did not report depression and anxiety outcomes specific to hormonal contraceptive use.

A comprehensive literature search was conducted across PubMed, SCOPUS, and ScienceDirect databases using a combination of keywords, including "hormonal contraceptive," "mental health," "depression," "anxiety," "women," and "female." Boolean operators, such as "AND" and "OR", were employed to refine the search, along with filters to limit results based on the specified publication period and language. Additional strategies, such as citation tracking and reference screening, were employed to ensure comprehensive coverage. After removing duplicates and screening titles and abstracts against the eligibility criteria, 11 studies were selected for inclusion in this review.

Data from the selected articles were summarized to capture key findings, including the study design, population characteristics, types of hormonal contraceptives assessed, and outcomes related to depression and anxiety. A narrative synthesis was used to analyze and integrate findings, highlighting consistent trends, methodological strengths, and potential gaps in the literature. This review aims to provide a coherent understanding of the relationship between hormonal contraceptive use and mental health outcomes, offering insights to inform future research and clinical practice. The stages of article identification, screening, and selection are illustrated in Figure 1.

Figure 1 PRISMA Flow with Modification



(Source : https://www.prisma-statement.org/prisma-2020-flow-diagram)

RESULTS

This review identified 11 studies that investigated the relationship between hormonal contraceptive use and mental health outcomes, specifically depression and anxiety. The studies, including cross-sectional, cohort, and case-control approaches, varied in design and were conducted across diverse populations and settings. While some studies suggested a potential association between hormonal contraceptive use and mental health outcomes, none established definitive causal relationships. Most findings were correlational, indicating trends rather than definitive proof of a cause-and-effect link.

The data from the reviewed studies are summarized in Tables 1 and 2. Table 1 provides an overview of study characteristics, including author, year, location, design, and sample size. Table 2 summarises the main findings, focusing on mental health outcomes such as the prevalence or severity of depression and anxiety, as well as whether associations or causal inferences were identified.

Table 1 Studies Characteristics

No	Author, Year	Location	Objectives	Study Population and Sample Size	Methods
1.	(Yusuf et al., 2024)	Somalia	"To study the relationship between hormonal contraceptive use and depression."	"A sample size of 227 married women aged 15–49 using hormonal contraceptives"	cross-sectional study
2.	(Skovlund et al., 2016)	Denmark	"To investigate whether the use of hormonal contraception is positively associated with subsequent use of antidepressants and a diagnosis of depression at a psychiatric hospital."	"All women and adolescents aged 15 to 34 years who were living in Denmark"	a nationwide prospective cohort study
3.	(Singata-Madliki et al., 2016)	South Africa	"To determine whether DMPA increases the risk of PND compared with the copper-containing intrauterine device (IUD) when administered after delivery."	"A sample size is 242 women."	A single-blind, randomized controlled trial
4.	(Lundin et al., 2023)	Sweden	"To analyze whether girls and young women with ADHD are at increased risk for depression during HC use compared with women without ADHD."	"29,767 girls and young women with ADHD aged 15 to 24 years and 763,146 without ADHD."	cohort study
5.	(Lundin et al., 2017)	Sweden	"To prospectively estimate the severity of adverse mood in COC users that would be as representative of general users as possible."	• "A Sample size of participants is 178." • "84 women in the COC group and 94 women in the placebo group"	cohort study
6.	(Louis et al., 2022)	USA	"To examine this association in women by testing the moderating	• "A Sample size of participants is 68	case-control study

No	Author, Year	Location	Objectives	Study Population and Sample Size	Methods
			effect of hormonal contraceptive (HC) use on the relationship between worry – i.e., a transdiagnostic cognitive dimension of anxiety – and the ERN."	undergraduate women." • "30 were using HCs, and 38 were not using any form of HC."	
7	(Larsen et al., 2023)	Denmark	"To determine whether prior depression associated with HC initiation is coupled with a higher risk of postpartum depression (PPD) than prior depression not associated with HC initiation."	"All women living in Denmark born after 1978 with their first delivery between January 1, 1996, and June 30, 2017, were eligible for inclusion; 269,354 met these criteria."	cohort study
8	(Albawardi et al., 2022)	Arab Saudi	"To estimate the prevalence of depression amongst hormonal and non-hormonal contraception users, and the risk factors associated with depression in the sample."	• "All participants were women, living in Saudi Arabia, ≥21 years old and ≤45 years old, using a contraceptive method, and with no established history of depression." • "A total of 4853 out of 18,596 met criteria."	community-based cross-sectional study
9	(Alfaifi et al., 2021)	Arab Saudi	"To estimate the prevalence of depression among HC users who visit primary health care centres in the Jazan Province of Saudi Arabia and to identify psychosocial factors that may predispose HC users to depression."	"A Sample size of participants is 904 women."	cross-sectional study
10	(de Wit et al., 2020)	Netherland	"To investigate the association between oral contraceptive use and depressive symptoms and to examine whether this association is affected by age and which specific symptoms are associated with oral contraceptive use."	"2230 children recruited from primary schools in 2001 and 2002."	Prospective cohort study
11	(Anderl et al., 2022)	Netherland	"To examine the association between adolescent OC use and subsequent depression risk in early adulthood, analyzing all theoretically justifiable models."	"2230 children recruited from primary schools in 2001 and 2002."	prospective cohort study

(source: synthesized from various articles that meet the criteria)

The studies reviewed generally found associations rather than causal relationships. Most relied on observational designs, which inherently limit the ability to draw causal inferences. The heterogeneity of study designs, populations, and methods further underscores the need for caution in interpreting the results. Future research with longitudinal and experimental designs is needed to understand the causal pathways, if any, linking hormonal contraceptive use to mental health outcomes.

Association with Depression

Based on the results of data analysis, it was found that users of hormonal contraception exhibit a significantly higher prevalence of depression compared to non-hormonal contraception users. A study conducted in Somalia found that the prevalence of depression among participants using hormonal contraceptives was 33.5%, based on a sample of 227, with an odds ratio (AOR) of 2.26 (95% CI=1.11–4.63) for the implant method and 2.25 (95% CI=1.18–4.32) for oral contraceptive pills. The analysis indicated a significant relationship between the severity of depression and the use of hormonal contraceptives, as well as the duration of contraceptive use. Furthermore, socioeconomic factors such as employment status, income level, and housewife status were significantly associated with depression. Women using hormonal contraception, particularly those taking oral pills or using implants, as well as those with shorter durations of contraceptive use, demonstrated higher levels of depression compared to their counterparts. Additionally, homemakers and individuals in lower income brackets exhibited an increased risk of experiencing depressive symptoms.

Another study conducted in South Africa revealed that the type of contraception utilized significantly affects the levels of depression experienced by users. Specifically, users of hormonal contraception, particularly those using Depot Medroxyprogesterone Acetate (DMPA), reported higher depression scores compared to users of intrauterine devices (IUDs). These findings underscore the notion that the choice of contraceptive method may play a crucial role in influencing the mental health of users. Similar results were also observed in research conducted in Saudi Arabia, which indicated that one-third of women using hormonal contraception exhibited signs of mood disorders. When compared to other groups, there is a statistically significant difference, suggesting that hormonal contraception users had a higher incidence of depression.

Furthermore, the type of contraception used also has a substantial impact on the level of depression experienced. The type of contraception used and the severity of depression are strongly correlated, indicating that the method of contraception a person chooses may have an impact on their mental health. Another study found that the use of hormonal contraceptives is associated with the occurrence of postpartum depression. According to a Danish study, women who experience depression as a result of using hormonal contraceptives (HC) are more likely to develop postpartum depression (PPD) than women who have previously experienced depression unrelated to HC usage. This finding lends credence to the theory that depression experienced while using hormonal contraceptives may serve as a predictor for future PPD risk.

Association with Anxiety

In contrast, no significant differences were observed in anxiety disorders between hormonal contraceptive users and other demographic groups. One of the two publications reviewed indicated that there is no significant difference in the prevalence of anxiety disorders between hormonal contraceptive (HC) users and non-users. This study, conducted in the United States, involved a comparative analysis between a group of HC users and a control group of non-HC users, revealing no statistically significant variance in anxiety levels. However, another study from Sweden observed a modest but significant increase in anxiety symptoms during the intermenstrual phase among HC users. Moreover, women who had previously experienced adverse reactions to hormonal contraceptives reported a notably lower mood during this phase

compared to women who had not experienced such issues, suggesting that prior negative experiences with HC may exacerbate intermenstrual mood disturbances. These findings highlight the importance of considering individual experiences and the phase of the menstrual cycle when assessing the psychological impact of hormonal contraception.

Risks for Adolescents and Women with Mental Disorders

The article below, which reports on a study conducted in Sweden, shows that teenage females who use oral hormonal contraception are more likely to experience depression. Adolescents are the most vulnerable group to mental health disorders. As reported by the World Health Organization, 3.6% of adolescents between the ages of 10-14 and 4.6% of those aged 15-19 experience anxiety disorders. Depression is anticipated to impact 1.1% of adolescents in the 10-14 age group and 2.8% in those aged 15-19. Similarly, a study from the Netherlands found that 16-year-old girls had greater depressive symptom scores when using oral contraceptives. As a result, it is critical to monitor depressive symptoms in teenagers who use oral contraceptives, as these contraceptives can have an impact on their overall well-being. In another study conducted in the Netherlands, it was shown that the use of oral contraceptives (OC) among adolescents is associated with a small but significant increased risk of developing major depressive disorder (MDD), particularly in girls who do not have a history of MDD during adolescence. This finding indicates that OCD can impact mental health, even in individuals who have not previously experienced depression. Therefore, it is crucial to understand the adverse effects that OC may cause so that women and doctors can make the right choices when selecting a contraceptive method. By being aware of these risks, women can better consider contraceptive options that align with their mental and physical health. An open discussion between patients and healthcare providers about potential side effects, including impacts on mood and the risk of depression, can aid in better decision-making and reduce the likelihood of mental health issues arising in the future.

Along with teenagers who are at high risk of developing depression when using hormonal contraception, using hormonal contraception in women with a prior history of mental illness poses an even greater risk of depression. Many studies have found a link between the use of hormonal contraception and the prevalence of depression; however, women with a history of mental problems may be at an even higher risk. According to a study conducted in Sweden, women with a history of ADHD are more likely to develop depression when using oral hormonal contraception than their unaffected peers.

Table 2. Main Findings

No	Author	Key Finding	Outcome	Causal or Correlation
1	(Yusuf et al., 2024)	• "Depression was reported by 33.5% of participants, and there were significant correlations with occupation, income level, hormonal contraceptive type, and length of contraceptive use." • "Housewives, low-income people, oral pill and implant users, and those who used contraception for a brief time were all at a higher risk of depression."	Depression	Correlation
2	(Skovlund et al., 2016)	• "Use of hormonal contraception, especially among adolescents, was associated with subsequent use of antidepressants and a first diagnosis of depression, suggesting depression as a potential adverse effect of hormonal contraceptive use."	Depression	Correlation

No	Author	Key Finding	Outcome	Causal or Correlation
3	(Singata-Madliki et al., 2016)	• "One-month EPDS depression scores were statistically significantly higher in the DMPA arm compared with the IUD arm (p=0.04)." • "Three-month BDI-II scores were significantly higher in the DMPA arm than in the IUD arm (p=0.002) and, according to the BDI-II but not the EPDS, more women in the DMPA arm had major depression at this time-point (8 vs 2; p=0.05)."	Depression	Correlation
4	(Lundin et al., 2023)	• "Women with ADHD had a 3-fold higher risk of developing depression, irrespective of HC use • Girls and young women with ADHD have an increased risk of developing depression when using oral HC compared with their unaffected peers."	Depression	Correlation
5	(Lundin et al., 2017)	• "COC use led to small but significant increases in anxiety and mood fluctuations during the intermenstrual phase, but significantly improved depression before menstruation." • "Women who had negative experiences with hormonal contraception reported considerably poorer mood during the intermenstrual period compared to healthy women."	Anxiety	Correlation
6	(Louis et al., 2022)	• "Anxiety in women using HCs was not significantly different from naturally cycling women." • "Significant and large relationship between worry and enlarged ERN in women using HCs, which was smaller and nonsignificant in naturally cycling women."	Anxiety	Correlation
7	(Larsen et al., 2023)	• "Women with HC-associated depression had a higher risk of PPD than women with prior non-HC-associated depression." • "History of HC-associated depression may be associated with a higher risk of PPD, supporting that HC-associated depression may indicate PPD susceptibility."	Depression	Correlation
8	(Albawardi et al., 2022)	• "The current study shows a high prevalence of depression amongst hormonal contraceptive users compared to non-hormonal contraceptive users."	Depression	Correlation
9	(Alfaifi et al., 2021)	• "One-third of women using HC were found to have signs of mood instability." • "A significant correlation (P-value = 0.01) was established between the type of contraception used and depression severity." • "HC users had significantly higher rates of depression (P < 0.001). Nine hundred four women were asked about their use of contraception and the occurrence of depression symptoms."	Depression	Correlation

No	Author	Key Finding	Outcome	Causal or Correlation
10	(de Wit et al., 2020)	• "Oral contraceptive use was not associated with depression symptoms across all age groups." • "Girls aged 16 reported greater depressive symptom scores when using oral contraceptives." • "Monitoring depressed symptoms in teenagers using oral contraceptives is critical since it can impact their quality of life."	Depression	Correlation
11	(Anderl et al., 2022)	• "Adolescent OC use was associated with a modest but significant increased risk of developing an episode of MDD, particularly among women who had no prior history of MDD in adolescence." • "Understanding the potential negative effects of OCs can assist women and their doctors in making informed decisions about the many types of birth control available."	Depression	Correlation

(Source: synthesized from various articles that meet the criteria)

DISCUSSION

Depression is the most common mental health disorder among women and a significant global health concern. (Murray & Lopez, 1996). Women are at a much higher risk for depression and anxiety compared to men, with lifetime rates of depression and anxiety disorders being approximately twice as high for women. (Altemus et al., 2014). This gender disparity is attributed to a variety of factors, including biological, hormonal, and psychosocial influences. Additionally, women are more prone to internalizing disorders such as depression, anxiety, and eating disorders. At the same time, men are more likely to suffer from externalizing disorders like substance abuse and antisocial behaviours. (Kuehner, 2017).

Hormonal contraception (HC), which includes oral contraceptives, implants, and injectable methods like DMPA, is widely used around the world. Over 200 million women of reproductive age use hormonal contraceptives. (Haakenstad et al., 2022), making it an essential part of family planning and reproductive healthcare. This study, drawing from research conducted in countries such as Saudi Arabia, Somalia, and South Africa, indicates a significant relationship between hormonal contraceptive use and an increased risk of depression, particularly with oral contraceptives, implants, and DMPA. These findings align with previous research by Sundström-Poromaa, (2021), which also identified a link between hormonal contraceptive use and heightened depression risk.

Hormonal contraceptives have long been recognized for their impact on the brain, primarily through estrogen receptors in several key areas such as the hippocampus, amygdala, and hypothalamus. (Song et al., 2023). These receptors influence brain plasticity and modulate neurochemical systems involved in mood regulation, such as serotonergic, dopaminergic, and noradrenergic pathways.(Iqbal et al., 2024). Estrogen's effect on these pathways may partly explain why hormonal contraceptives are linked to depressive symptoms in some users, particularly those who are already vulnerable due to pre-existing mental health conditions.

Despite the strong association between hormonal contraceptives and depression, the relationship between these contraceptives and anxiety disorders is less clear. Some studies conducted in Sweden and the United States have shown no significant impact on anxiety levels, while others report slight increases in anxiety in users of specific contraceptive methods. These

inconsistent findings may be attributed to several factors, including study design (cross-sectional vs. longitudinal studies), sample sizes, and variations in the types of contraceptives studied. Additionally, individual factors such as genetic predispositions and previous mental health issues could play a role in how hormonal contraceptives affect anxiety, which may explain the disparity in results across studies.

Another key finding from this study is the heightened vulnerability to mental health issues among adolescents and women with a history of mental disorders. Adolescence is a crucial developmental stage, and depression rates among adolescent girls increase significantly after puberty, peaking by the end of adolescence. (Keyes et al., 2024). Family history of depression and exposure to psychosocial stress are major risk factors for mental health problems during this time. (Van Dijk et al., 2021). Hormonal contraception, primarily when used by adolescents who are already at high risk for depression, may further exacerbate these issues. Similarly, women with a history of mental health disorders are more susceptible to adverse mental health outcomes when using hormonal contraception (Lundin et al., 2023).

While the findings of this study suggest a clear association between hormonal contraceptive use and depression, conflicting results exist in the literature. Despite the widespread use of hormonal contraceptives, evidence of their potential psychological effects remains inconsistent and underexplored. (Bitzer, 2024). Some studies, particularly those examining widely used contraceptives like the combined oral contraceptive (COC) or progestogen-only pill (POP), have found no significant link between contraceptive use and depression risk. (Lundin et al., 2022). Reviews published in 2018, 2020, and 2021 also did not find a clear relationship between hormonal contraception and depression (Albawardi et al., 2022). These discrepancies may stem from differences in study design, population demographics (such as age and pre-existing mental health conditions), and the types of hormonal contraceptives used. For example, while COCs may be linked to mood changes in some populations, other methods, such as IUDs, may not exhibit the same effects.

Given these conflicting results, further research is needed to better understand the complex relationship between hormonal contraception and mental health, particularly depression. Future studies should explore the long-term effects of different contraceptive methods on mental health and investigate the mechanisms behind hormonal contraception's potential impact on mood. It is also essential to consider alternative contraceptive methods that may reduce the mental health risks associated with hormonal contraception. This research is crucial to developing more effective and safer contraceptive guidelines and providing the necessary support to women, especially adolescents, who are particularly vulnerable to the psychological effects of hormonal contraception.

CONCLUSION

In conclusion, this study highlights a significant relationship between the use of hormonal contraception and an increased risk of depression. Specifically, the findings suggest that hormonal contraceptives, especially combination methods, are linked to higher rates of depression, particularly among women with pre-existing mental health conditions and adolescents. These findings point to the need for a more nuanced understanding of the psychological effects of hormonal contraceptives.

Healthcare providers, including family planning counsellors and health promoters, must be proactive in recognizing these potential risks, ensuring that mental health is considered alongside physical health when discussing contraceptive options, particularly for vulnerable groups. In Indonesia, the BKKBN, the leading body for family planning initiatives, should develop policies integrating mental health screening into family planning services. Such policies would involve providing family planning officers (PLKB) with guidelines to assess the mental health status of potential contraceptive users before recommending hormonal methods. Additionally, BKKBN

could consider implementing routine mental health assessments for women using hormonal contraception.

Finally, the study underscores the need for further research into the complex relationship between hormonal contraception and mental health. Future investigations should explore alternative contraceptive methods that might mitigate these mental health risks. By addressing these concerns, this research contributes to the improvement of healthcare services for women, ultimately benefiting both individual well-being and the broader community.

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