

Hormonal Contraceptive Use and Its Impact on Lipid Profiles in Reproductive-Age Women

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Abstract

Background: Hormonal contraceptives are widely used among reproductive-age women and may influence lipid metabolism through hormonal effects on hepatic function. Understanding their impact on lipid profiles is important for assessing long-term cardiovascular risk. **Objective:** To evaluate the impact of hormonal contraceptive use on lipid profiles in reproductive-age women and to identify factors associated with dyslipidemia. **Methods:** This was a cross-sectional analytical study conducted at Ha'il from 2026 including 195 reproductive-age women to evaluate the impact of hormonal contraceptive use on lipid profiles. **Results:** Hormonal contraceptive users demonstrated significantly higher total cholesterol (201.6 ± 32.4 vs 178.9 ± 28.7 mg/dL), LDL cholesterol (126.8 ± 24.6 vs 108.4 ± 21.3 mg/dL), and triglycerides (164.5 ± 39.7 vs 128.3 ± 31.5 mg/dL) compared to non-users (all $p < 0.001$). HDL cholesterol was also slightly higher in users (49.2 ± 8.1 vs 45.8 ± 7.4 mg/dL; $p = 0.006$). Lipid alterations became more pronounced with longer contraceptive use, particularly beyond 24 months. Injectable and combined oral contraceptives showed greater metabolic impact compared to progestin-only pills. Dyslipidemia was significantly associated with prolonged contraceptive use, obesity, sedentary lifestyle, smoking, and combined oral contraceptive use. **Conclusion:** Hormonal contraceptive use is associated with significant lipid profile alterations, particularly with long-term use and certain contraceptive formulations. Regular monitoring and individualized contraceptive counseling may help reduce potential cardiovascular risk.

Keywords: Hormonal contraceptives, lipid profile, dyslipidemia, reproductive-age women, cholesterol, triglycerides, cardiovascular risk

How to cite this article: Einas Mustafa Mudawi Ahmed, Hamdan Siddig Sirag Ahmad, Rania Abdeen H. Abdalla, Fahmida Khatoon, Rana Aboras, Marwah Mohamad Amen Fallath, Sumia Fadul Ahmed, Hamad Turki Alreshidi, Samiyah Menwer

Alrashdi, Sultan Ghazi, Naglaa Ahmed Abdellatif Ginawi and Fatima Diab Mohammed Osman. Hormonal Contraceptive Use and Its Impact on Lipid Profiles in Reproductive-Age Women. *Int J Drug Deliv Technol.* 2026;16(81s):994-998. DOI: 10.25258/ijddt.16.81s.127

Introduction

Hormonal contraceptives are widely used by women of reproductive age for effective birth control and management of gynecological conditions such as menstrual irregularities and polycystic ovarian syndrome [1]. These contraceptives primarily contain estrogen and/or progestin, which exert systemic metabolic effects beyond their reproductive function [3]. While generally considered safe, concerns have been raised regarding their impact on cardiovascular risk factors, particularly lipid metabolism [5]. Lipid profile alterations, including changes in total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL), and triglycerides, play a crucial role in the development of atherosclerosis and cardiovascular disease [2]. Hormonal contraceptives, especially combined oral contraceptives, are known to influence lipid metabolism through hepatic effects mediated by estrogen and progestin components [4]. Estrogen is generally associated with beneficial lipid changes, such as increased HDL and reduced LDL levels, whereas progestins may counteract these effects depending on their androgenic activity [6]. The net impact of hormonal contraceptives on lipid profile varies based on the type, dose, and duration of use, as well as individual patient characteristics [7]. Several studies have reported that long-term use of hormonal contraceptives may lead to elevated triglyceride levels and alterations in cholesterol fractions, potentially increasing cardiovascular risk in susceptible individuals [8]. Conversely, some formulations with lower estrogen doses or newer generation progestins have shown more favorable lipid profiles [9].

Understanding these metabolic effects is particularly important in reproductive-age women, as early alterations in lipid profile may contribute to long-term cardiovascular morbidity [10]. Monitoring lipid levels in women using hormonal contraceptives may help identify those at increased risk and guide safer contraceptive choices [11]. Previous research has demonstrated variable effects of hormonal contraceptives on lipid parameters, with some studies reporting significant increases in total cholesterol and triglycerides, while others have observed minimal or neutral effects [12]. These inconsistencies highlight the need for further evaluation, especially in different populations and clinical settings. In addition to lipid changes, other factors such as lifestyle, diet, body mass index, and genetic predisposition may influence the overall metabolic impact of contraceptive use [13].

Therefore, a comprehensive assessment is necessary to accurately determine the relationship between hormonal contraceptives and lipid profile alterations. Despite widespread use of hormonal contraceptives, there remains limited consensus regarding their long-term metabolic safety, particularly in diverse populations [14]. This underscores the importance of evaluating their impact in real-world clinical settings.

Objective: To evaluate the impact of hormonal contraceptive use on lipid profiles in reproductive-age women and to identify factors associated with dyslipidemia.

Methodology

This was a cross-sectional analytical study conducted at _____ from _____, including 195 reproductive-age women to evaluate the impact of hormonal contraceptive use on lipid profiles. Participants were categorized into hormonal contraceptive users and non-users for comparative analysis of lipid parameters.

Inclusion Criteria

- Women aged 18–45 years
- Women using hormonal contraceptives for at least 6 months
- Sexually active reproductive-age women willing to participate
- Women providing informed consent

Exclusion Criteria

- Women with known dyslipidemia or cardiovascular disease
- Pregnant or lactating women
- Women using lipid-lowering medications
- Women with diabetes mellitus, thyroid disorders, or chronic liver disease
- Women with incomplete clinical or laboratory data

Data Collection

After ethical approval, demographic and clinical information was collected using a structured proforma, including age, body mass index (BMI), duration and type of contraceptive use, smoking status, dietary

habits, and physical activity level. Blood samples were obtained after overnight fasting for analysis of lipid profile parameters, including total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL), and triglycerides. Participants were divided into hormonal contraceptive users and non-users, and further subgroup analysis was performed according to contraceptive type and duration of use.

Statistical Analysis

Data were analyzed using SPSS version 26.0. Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were presented as frequency and percentage. Independent t-test and chi-square test were used to compare lipid parameters between groups. Correlation and regression analyses were performed to assess the relationship between duration of contraceptive use and lipid profile changes. A p-value ≤ 0.05 was considered statistically significant.

Results

A total of 195 reproductive-age women were included with a mean age of 29.8 ± 6.4 years, most commonly in the 26–35 year group (47.2%). The mean BMI was 27.1 ± 3.9 kg/m², indicating an overall overweight population. Hormonal contraceptive users constituted 60.5% of participants, with a mean duration of use of 18.6 ± 7.8 months. Most women were non-smokers (85.6%), while sedentary lifestyle was observed in 57.9% of participants.

Table 1: Baseline Demographic and Clinical Characteristics of Participants (n=195)

Variable	Category	Total n (%) / Mean $\pm$ SD
Age (years)	Mean $\pm$ SD	29.8 ± 6.4
	18–25 years	58 (29.7%)
	26–35 years	92 (47.2%)
	>35 years	45 (23.1%)
BMI (kg/m ²)	Mean $\pm$ SD	27.1 ± 3.9
Hormonal Contraceptive Users	Yes	118 (60.5%)
	No	77 (39.5%)
Duration of Contraceptive Use (months)	Mean $\pm$ SD	18.6 ± 7.8

Smoking Status	Smokers	28 (14.4%)
	Non-Smokers	167 (85.6%)
Physical Activity	Active	82 (42.1%)
	Sedentary	113 (57.9%)

Hormonal contraceptive users demonstrated significantly altered lipid profiles compared to non-users. Mean total cholesterol was higher among users (201.6 ± 32.4 mg/dL vs 178.9 ± 28.7 mg/dL; $p < 0.001$), along with increased LDL levels (126.8 ± 24.6 vs 108.4 ± 21.3 mg/dL). Triglycerides were also significantly elevated in users (164.5 ± 39.7 vs 128.3 ± 31.5 mg/dL; $p < 0.001$). HDL cholesterol was slightly higher in users (49.2 ± 8.1 vs 45.8 ± 7.4 mg/dL; $p = 0.006$). The LDL/HDL ratio was modestly increased in contraceptive users, indicating a potentially less favorable lipid profile.

Table 2: Comparison of Lipid Profiles Between Hormonal Contraceptive Users and Non-Users

Lipid Parameter	Users (n=118) Mean $\pm$ SD	Non-Users (n=77) Mean $\pm$ SD	P-value
Total Cholesterol (mg/dL)	201.6 ± 32.4	178.9 ± 28.7	<0.001
LDL Cholesterol (mg/dL)	126.8 ± 24.6	108.4 ± 21.3	<0.001
HDL Cholesterol (mg/dL)	49.2 ± 8.1	45.8 ± 7.4	0.006
Triglycerides (mg/dL)	164.5 ± 39.7	128.3 ± 31.5	<0.001
LDL/HDL Ratio	2.58 ± 0.72	2.37 ± 0.64	0.041

Lipid profile alterations became more pronounced with longer duration of contraceptive use. Women using contraceptives for more than 24 months had the highest total cholesterol (218.7 ± 34.8 mg/dL), LDL (136.9 ± 25.9 mg/dL), and triglyceride levels (181.3 ± 41.2 mg/dL), compared to shorter-duration users. HDL levels also showed a mild increase over time, rising from 47.5 ± 7.6 mg/dL in the 6–12 month group to 51.2 ± 8.3 mg/dL in long-term users. These findings suggest a duration-dependent metabolic effect of hormonal contraceptive use ($p = 0.012$).

Table 3: Lipid Profile Changes According to Duration of Hormonal Contraceptive Use

Duration of Use	Total Cholesterol Mean $\pm$ SD	LDL Mean $\pm$ SD	HDL Mean $\pm$ SD	Triglycerides Mean $\pm$ SD	P-value
6–12 months (n=38)	188.4 $\pm$ 28.6	117.2 $\pm$ 20.8	47.5 $\pm$ 7.6	148.2 $\pm$ 34.1	0.012
13–24 months (n=49)	203.6 $\pm$ 31.4	127.8 $\pm$ 23.7	49.4 $\pm$ 8.0	165.6 $\pm$ 38.5	
>24 months (n=31)	218.7 $\pm$ 34.8	136.9 $\pm$ 25.9	51.2 $\pm$ 8.3	181.3 $\pm$ 41.2	

Different contraceptive types demonstrated varying effects on lipid profiles. Injectable contraceptives were associated with the highest mean total cholesterol (214.3 ± 35.7 mg/dL), LDL (134.6 ± 26.3 mg/dL), and triglycerides (178.9 ± 42.5 mg/dL), followed closely by combined oral contraceptives. Progestin-only pills showed comparatively lower lipid alterations. Combined oral contraceptives were the most commonly used method (54.2%) and were significantly associated with unfavorable lipid changes overall ($p < 0.001$).

Table 4: Association of Contraceptive Type With Lipid Profile Alterations

Contraceptive Type	n (%)	Total Cholesterol Mean $\pm$ SD	LDL Mean $\pm$ SD	Triglycerides Mean $\pm$ SD	P-value
Combined Oral Contraceptives	64 (54.2%)	209.8 $\pm$ 33.1	131.4 $\pm$ 24.8	172.5 $\pm$ 40.1	<0.001
Progestin-Only Pills	32 (27.1%)	194.6 $\pm$ 29.5	121.8 $\pm$ 22.7	156.7 $\pm$ 35.6	
Injectable	22 (18.6%)	214.3 $\pm$ 35.7	134.6 $\pm$ 26.3	178.9 $\pm$ 42.5	

Contraceptives			26.3		
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Several factors were significantly associated with dyslipidemia among hormonal contraceptive users. Long-term use exceeding 24 months was strongly linked with dyslipidemia (61.7% vs 17.9%; $p < 0.001$). Obesity (BMI ≥ 30 kg/m²) was also associated with higher dyslipidemia rates (51.1%), while sedentary lifestyle and smoking further increased risk. Combined oral contraceptive use was more frequent among women with dyslipidemia (66.0% vs 49.3%; $p = 0.028$), indicating that both contraceptive-related and lifestyle factors contribute to adverse lipid changes.

Table 5: Factors Associated With Dyslipidemia Among Hormonal Contraceptive Users

Variable	Dyslipidemia Present n (%)	Dyslipidemia Absent n (%)	P-value
Duration >24 months	29 (61.7%)	12 (17.9%)	<0.001
BMI ≥ 30 kg/m ²	24 (51.1%)	16 (23.9%)	0.003
Sedentary Lifestyle	36 (76.6%)	42 (62.7%)	0.041
Smoking	14 (29.8%)	6 (9.0%)	0.002
Combined Oral Contraceptive Use	31 (66.0%)	33 (49.3%)	0.028

Discussion

This study evaluated the impact of hormonal contraceptive use on lipid profiles in reproductive-age women and demonstrated significant alterations in lipid metabolism among contraceptive users compared to non-users. The findings suggest that hormonal contraceptives, particularly with prolonged use, may contribute to dyslipidemia and potentially increase long-term cardiovascular risk [15]. A major finding of this study was the significantly higher levels of total cholesterol, LDL cholesterol, and triglycerides among hormonal contraceptive users. Mean total cholesterol was 201.6 ± 32.4 mg/dL in users compared to 178.9 ± 28.7 mg/dL in non-users ($p < 0.001$), while LDL levels were also significantly elevated (126.8 ± 24.6 vs 108.4 ± 21.3 mg/dL). Triglycerides showed marked elevation among users (164.5 ± 39.7 vs 128.3 ± 31.5 mg/dL; $p < 0.001$). These findings indicate that hormonal contraceptive exposure may adversely influence lipid metabolism. Previous research has similarly reported increases in total cholesterol, LDL,

and triglyceride levels among hormonal contraceptive users, particularly with estrogen-containing formulations [16]. Interestingly, HDL cholesterol levels were also slightly higher among contraceptive users (49.2 ± 8.1 vs 45.8 ± 7.4 mg/dL; $p=0.006$). This may reflect the estrogen-mediated beneficial effect on HDL metabolism, despite simultaneous increases in atherogenic lipids. Previous research has also demonstrated that estrogen-containing contraceptives may raise HDL levels while still contributing to an overall unfavorable lipid profile due to concurrent increases in triglycerides and LDL [17]. The duration of contraceptive use had a clear association with worsening lipid parameters. Women using contraceptives for more than 24 months had the highest total cholesterol (218.7 ± 34.8 mg/dL), LDL (136.9 ± 25.9 mg/dL), and triglyceride levels (181.3 ± 41.2 mg/dL). These findings suggest a cumulative metabolic effect with prolonged hormonal exposure. Previous research has similarly shown that long-term contraceptive use is associated with progressive lipid profile alterations and increased cardiovascular risk markers [18].

Different contraceptive formulations demonstrated varying metabolic effects. Injectable contraceptives were associated with the most pronounced lipid alterations, followed by combined oral contraceptives, while progestin-only pills showed comparatively milder effects. This variation may be related to differences in hormonal composition, estrogen dose, and androgenic properties of progestins. Previous research has likewise reported that injectable and combined hormonal contraceptives may exert stronger effects on lipid metabolism compared to lower-dose or progestin-only formulations [19]. The study also identified several factors associated with dyslipidemia among contraceptive users, including obesity, sedentary lifestyle, smoking, and prolonged contraceptive use. Long-term use exceeding 24 months showed the strongest association with dyslipidemia (61.7% vs 17.9%; $p<0.001$). Lifestyle-related factors such as smoking and physical inactivity further amplified metabolic risk. Previous research has similarly emphasized that hormonal contraceptive effects on lipid metabolism may be exacerbated by pre-existing cardiovascular risk factors and unhealthy lifestyle behaviors [20]. The findings of this study have important clinical implications. Although hormonal contraceptives remain highly effective and widely used, monitoring lipid profiles may be beneficial in women with prolonged use or additional cardiovascular risk factors. Lifestyle counseling, weight management, and selection of lower-risk contraceptive formulations may help reduce adverse metabolic effects. Previous research has also

recommended individualized contraceptive counseling and periodic metabolic assessment in high-risk women [21]. Despite demonstrating significant associations, this study does not imply that all hormonal contraceptive users will develop clinically significant dyslipidemia. The observed changes were influenced by multiple interacting factors, including duration of use, contraceptive type, BMI, and lifestyle characteristics. Previous research has similarly noted variability in individual metabolic responses to hormonal contraceptives [22]. Overall, this study demonstrates that hormonal contraceptive use is associated with significant alterations in lipid profiles, particularly with prolonged use and certain contraceptive formulations. The findings align with previous research and highlight the importance of individualized contraceptive selection and metabolic monitoring in reproductive-age women.

Conclusion

It is concluded that hormonal contraceptive use is significantly associated with alterations in lipid profiles among reproductive-age women, particularly increased total cholesterol, LDL cholesterol, and triglyceride levels. These effects were more pronounced with longer duration of use and among users of injectable and combined oral contraceptives. Although HDL levels showed a modest increase, the overall lipid pattern suggested a potential rise in cardiovascular risk, especially in women with additional factors such as obesity, smoking, and sedentary lifestyle. These findings emphasize the importance of individualized contraceptive counseling, lifestyle modification, and periodic lipid profile monitoring in women using hormonal contraceptives for prolonged periods.

References

1. Regidor PA. Clinical relevance in present day hormonal contraception. *Horm Mol Biol Clin Investig*. 2019;37(1):20180030.
2. Cagnacci A, Biasioli A. The effect of hormonal contraceptives on metabolism. In: *Female and Male Contraception*. Cham: Springer; 2021. p. 299-317.
3. Hussain SM, Khan SA, Noor S, et al. Association of different formulation with oral contraceptive agents in lipid and carbohydrates metabolism in women. *Pak J Health Sci*. 2025.
4. Savva C, Korach-André M. Estrogen receptor beta regulation of lipid homeostasis. *Metabolites*. 2020;10(3):116.
5. Jeong KJ, Mukae M, Lee SR, et al. Progesterone increases hepatic lipid content and plasma lipid levels through PR-B-

- mediated lipogenesis. *Biomed Pharmacother.* 2024;172:116281.
6. Dou W, Huang Y, Liu X, et al. Associations of oral contraceptive use with cardiovascular disease and all-cause death. *J Am Heart Assoc.* 2023;12(16):e030105.
7. Brabaharan S, Veettil SK, Kaiser JE, et al. Association of hormonal contraceptive use with adverse health outcomes. *JAMA Netw Open.* 2022;5(1):e2143730.
8. Raaj I, Thalamati M, Gowda V, Rao A. Role of atherogenic index of plasma and Castelli risk index in cardiovascular disease. *Cureus.* 2024.
9. Turki A, Ayalew A, Mossie A, Mitiku S. Effects of hormonal contraceptives on lipid profile among women attending family planning unit in Ethiopia. *Reprod Health.* 2023;20(1):185.
10. Lumu W, Bahendeka S, Wesonga R, et al. Atherogenic index of plasma and cardiovascular risk factors among patients with type 2 diabetes. *Afr Health Sci.* 2023;23(1):515-527.
11. Salcedo-Cifuentes M, Belalcazar S, Acosta EY, Medina-Murillo JJ. Conventional biomarkers for cardiovascular risks and their correlation with Castelli risk indices and TG/HDL-C. *Arch Med.* 2020;20(1):11-22.
12. UN. *World Fertility and Family Planning 2020: Highlights.* United Nations; 2020.
13. Bekele D, Surur F, Nigatu B, et al. Contraceptive prevalence rate and associated factors among reproductive age women. *Contracept Reprod Med.* 2021;6(1):1-13.
14. Attri HK, Singh T, Kumar R, Kumar K, Puri A. Assessment of impact of oral contraceptives on lipid profile in premenopausal women. *Eur J Mol Clin Med.* 2021;7(9):2020.
15. Oumer M, Manaye A, Mengistu Z. Modern contraceptive method utilization and associated factors among reproductive-age women. *Open Access J Contracept.* 2020;11:53.
16. Sufa B, Abebe G, Cheneke W. Dyslipidemia and associated factors among women using hormonal contraceptives. *BMC Res Notes.* 2019;12(1):1-7.
17. McHugh RK, Weiss RD. Alcohol use disorder and depressive disorders. *Alcohol Res.* 2019.
18. Bhattacharya A, Pal B, Mukherjee S, Roy SK. Assessment of nutritional status using anthropometric variables. *BMC Public Health.* 2019;19(1):1-9.
19. Shiferaw M, Kassahun W, Zawdie B. Anthropometric indices, blood pressure, and lipid profile among women using progestin-only contraceptives. *BMC Womens Health.* 2021;21(1):34.
20. Mahmood IH, Jaber IM. Effects of hormonal contraceptives on serum glucose, lipid profile and liver function tests. *Iraqi J Pharm.* 2019;14(1):1-6.
21. Momeni Z, Dehghani A, Fallahzadeh H, et al. Impacts of low-dose pill contraceptive on nitric oxide, homocysteine, and lipid profiles. *Contracept Reprod Med.* 2020;5(1):1-6.
22. Zhang D, Wei Y, Huang Q, et al. Important hormones regulating lipid metabolism. *Molecules.* 2022;27(20):7052.