



ORIGINAL ARTICLE

Exploring the interactive effects of oral contraceptive use and dietary fat intake on blood pressure, cardiovascular reactivity, and glucose tolerance in normotensive women.

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ABSTRACT... Objective: To understand how dietary fat consumption and the use of oral contraceptives interact to affect blood pressure, cardiovascular reactivity, and glucose tolerance in normotensive women. **Study Design:** Cross-section study. **Setting:** Hayatabad Medical Complex, Peshawar. **Period:** December 2022 to April 2023. **Material & Methods:** A total of 120 normotensive women aged between 18 and 35 years were recruited from local healthcare centers, clinics, and educational institutions. Demographic characteristics, oral contraceptive use, and dietary fat intake were assessed through self-reporting and validated food frequency questionnaires. Resting blood pressure measurements, cardiovascular reactivity during standardized stressors, and glucose tolerance through oral glucose tolerance tests were recorded. **Results:** The study found no significant associations between oral contraceptive use and blood pressure, cardiovascular reactivity, or glucose tolerance. Similarly, dietary fat intake did not significantly influence these health parameters. **Conclusion:** The results emphasize the importance of personalized healthcare recommendations for women using oral contraceptives, considering individual variations and other lifestyle factors. Further research with larger, longitudinal studies is warranted to elucidate the potential long-term effects of these interactions and promote cardiovascular health for women worldwide.

Key words: Blood Pressure, Cardiovascular Reactivity, Dietary Fat, Glucose Tolerance, Normotensive Women, Oral Contraceptive.

INTRODUCTION

In recent decades, oral contraceptive pills have emerged as one of the most widely used methods of contraception worldwide, revolutionizing women's reproductive health choices¹ While these medications have proven to be highly effective in preventing unwanted pregnancies, their influence on various physiological parameters remains an area of ongoing research and interest The possible connection between the use of oral contraceptives and dietary fat consumption and its effects on crucial health indices, such as blood pressure, cardiovascular reactivity, and glucose tolerance, are one such area of concern.^{2,3} Several studies have indicated that oral contraceptives may induce changes in metabolic processes, leading to alterations in blood pressure regulation

and cardiovascular responses.^{4,5} On the other hand, dietary fat intake has long been implicated in the development of metabolic disturbances and cardiovascular diseases. However, the potential interplay between these two factors remains insufficiently explored, particularly in the context of normotensive women.^{6,7}

A well-designed and rigorous investigation of these interactions could have significant implications for women's health, potentially leading to personalized contraceptive and dietary recommendations for optimal metabolic and cardiovascular outcomes. Furthermore, findings from this study may contribute to the broader understanding of how hormonal contraception and dietary factors intersect, providing valuable

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insights into the broader relationship between lifestyle choices and cardiovascular health.⁸⁻¹⁰ Ultimately, this research endeavors to contribute to the advancement of evidence-based medical practices, empowering healthcare providers to offer tailored guidance to women utilizing oral contraceptives and seeking to optimize their overall health and well-being.

By examining the interactions between the use of oral contraceptives and dietary fat consumption with regard to the cardiovascular & metabolic parameters of normal in blood pressure women, the current study seeks to close this information gap. By unraveling the potential synergistic or antagonistic interactions between these variables, we seek to shed light on their combined impact and better understand the implications for women's health. The objectives of this study are threefold: To evaluate the specific and mixed effects of dietary fat consumption and oral contraceptive usage on blood pressure levels in women with normotensive hypertension. To investigate the influence of these factors on cardiovascular reactivity, specifically in response to standardized stressors, providing insights into the adaptive capacity of the cardiovascular system. And to evaluate the impact of the interactive effects on glucose tolerance, as an indicator of metabolic health and potential risk for future cardiovascular complications.

MATERIAL & METHODS

In a sample of 120 normotensive women between the ages of 18 and 35, the research used a cross-sectional observational design to examine the interactions between the use of oral contraceptives and dietary fat consumption on blood pressure, cardiovascular reactivity, and glucose tolerance. Study was conducted after approval of IRB certificate i-e 101-023, Study was done from December 2022 to April, 2023 at Hayatabad Medical Complex.

Participants were selected from local healthcare centers, clinics, and educational institutions, meeting the inclusion criteria of being normotensive women who had been using oral contraceptives for a minimum of six months.

Pregnant or lactating women, individuals with a history of cardiovascular disease, diabetes, or other metabolic disorders, and those taking medications that may interfere with the study outcomes were excluded. All participants provided informed consent before their involvement in the study.

Data Collection was done as Oral Contraceptive Use: Participants' oral contraceptive usage details, including the type, duration, and adherence to medication, were recorded through self-reporting and confirmed through prescription documentation. Dietary Fat Intake: Dietary fat intake was assessed using a validated food frequency questionnaire, capturing participants' habitual dietary patterns and consumption of various fat sources. Blood Pressure Measurement: Resting blood pressure was measured using a digital sphygmomanometer after participants had been seated and at rest for at least 10 minutes. Three consecutive readings were taken, and the average value was used for analysis. Cardiovascular Reactivity: Participants were subjected to standardized stressors, such as mental arithmetic tasks or cold pressure tests, to evaluate their cardiovascular reactivity. Changes in heart rate and blood pressure during stressor exposure were recorded and analyzed. Glucose Tolerance: Participants conducted an oral glucose tolerance test (OGTT) to measure their glucose tolerance after fasting for the previous night. At the beginning, blood samples were taken and at specific intervals after glucose ingestion to evaluate the blood glucose response.

The statistical analysis was done by demographics, oral contraceptive use, dietary fat consumption, blood pressure, cardiovascular reactivity, and glucose tolerance of the subjects were summarized using descriptive statistics. To compare variables across groups (for example, OCP users vs. non-users, high vs. low dietary fat consumption), statistical analyses were performed, such as t-tests or analysis of variance (ANOVA). With possible confounding variables taken into account, regression analysis was used to investigate the interaction effects of oral contraceptive usage and dietary fat consumption

on the research findings.

RESULTS

Demographic Characteristics of Participants

120 normotensive women between the ages of 18 and 35 took part in the research. The participants' average age was 26.4 ± 4.1 and their average body mass index (BMI) was 23.8 ± 2.5. Out of the 120 participants, 68 (56.7%) reported using oral contraceptives, while 52 (43.3%) were non-users. In terms of dietary fat intake, 49 (40.8%) participants had a high dietary fat intake, while 71 (59.2%) had a low dietary fat intake (Table-I).

Characteristic	Mean ± SD (or N, %)
Age (years)	26.4 ± 4.1
Body Mass Index (BMI)	23.8 ± 2.5
Oral Contraceptive Use	
- Yes	68 (56.7%)
- No	52 (43.3%)
Dietary Fat Intake	
- High	49 (40.8%)
- Low	71 (59.2%)

Table-I. Demographic characteristics of participants

Note: SD - Standard Deviation, N - Number of Participants

Effects of Diet Fat Consumption on Blood Pressure, Cardiovascular Reactivity, & Glucose Tolerance and Oral Contraceptive Usage

Blood Pressure

There were no significant differences in systolic blood pressure between oral contraceptive users (120 ± 10 mmHg) and non-users (118 ± 9 mmHg) ($p = 0.083$). Similarly, diastolic blood pressure did not significantly differ between the two groups, with oral contraceptive users having

a mean diastolic blood pressure of 75 ± 8 mmHg and non-users having a mean of 74 ± 7 mmHg ($p = 0.215$).

Cardiovascular Reactivity

Cardiovascular reactivity, assessed through heart rate and systolic blood pressure response to standardized stressors, showed no significant differences between oral contraceptive users and non-users. The mean heart rate during stressor exposure was 86 ± 12 bpm for oral contraceptive users and 85 ± 11 bpm for non-users ($p = 0.492$). The mean systolic blood pressure response to stressors was 15 ± 6 mmHg for oral contraceptive users and 14 ± 5 mmHg for non-users ($p = 0.297$).

Glucose Tolerance

Between oral contraceptive users and non-users, fasting glucose levels did not substantially change ($p = 0.137$; 89 mg/dL vs. non-users). Likewise, there was no discernible difference between the two groups' 2-hour glucose levels, which were assessed during the oral glucose tolerance test, with oral contraceptive users having a mean glucose level of 134 ± 18 mg/dL and non-users having a mean of 133 ± 17 mg/dL ($p = 0.391$) (Table-II).

DISCUSSION

The findings of this research provide important light on the possible interactions between the use of oral contraceptives and dietary fat consumption in normotensive women's blood pressure, cardiovascular reactivity, and glucose tolerance.

Outcome Measure	Oral Contraceptive Use	Dietary Fat Intake	Interaction (OCP x Fat Intake)
Systolic Blood Pressure	120 ± 10 mmHg	118 ± 9 mmHg	$p = 0.083$
Diastolic Blood Pressure	75 ± 8 mmHg	74 ± 7 mmHg	$p = 0.215$
Cardiovascular Reactivity			
- Heart Rate (bpm)	86 ± 12	85 ± 11	$p = 0.492$
- Systolic BP Response	15 ± 6 mmHg	14 ± 5 mmHg	$p = 0.297$
Glucose Tolerance			
- Fasting Glucose (mg/dL)	89 ± 8	88 ± 7	$p = 0.137$
- 2-hr Glucose (mg/dL)	134 ± 18	133 ± 17	$p = 0.391$

Table-II. Examining the impact of oral contraceptive use and dietary fat intake on blood pressure, cardiovascular reactivity, and glucose tolerance

Note: Values are presented as mean ± SD. OCP - Oral Contraceptive Pill, BP - Blood Pressure

Although the observed differences between oral contraceptive users and non-users as well as those with high and low dietary fat intake, were not statistically significant, these findings have important implications for women's health and warrant further exploration. The lack of significant associations between oral contraceptive use and blood pressure levels aligns with some previous research, which suggests that hormonal contraceptives may have minimal effects on blood pressure in normotensive women.^{11,12} However, it is essential to consider the potential long-term consequences of these small differences, as even modest elevations in blood pressure could become clinically relevant over time. Similarly, oral contraceptive usage and dietary fat consumption had no discernible impact on cardiovascular reactivity, which is in line with those research that found very minor changes in heart rate and blood pressure in response to stresses¹³⁻¹⁵. However, it is worth noting that the use of standardized stressors in this study may not fully capture real-life stressors, and additional research using a broader range of stress-inducing stimuli could provide a more comprehensive understanding of cardiovascular reactivity in this context. The lack of significant differences in glucose tolerance between oral contraceptive users and non-users is in line with certain previous findings suggesting that hormonal contraceptives may have limited effects on glucose metabolism in normotensive women.¹⁶⁻¹⁸ However, as food, exercise, and hormonal state are all associated with glucose tolerance, it is crucial to take these confounding variables into account in any study addressing the possible correlations.^{19,20}

This study's cross-sectional methodology, which merely permits the detection of relationships rather than demonstrating causation, is one noteworthy flaw. Additionally, the dependence on self-reported dietary fat consumption adds possible recollection bias, and the relatively small sample size may limit the statistical ability to identify significant effects. The limitation of study was future research should take longitudinal designs into consideration. Furthermore, exploring other lifestyle factors, such as physical activity, smoking habits, and overall dietary patterns, would

provide a more comprehensive assessment of their influence on the study outcomes. Although the usage of oral contraceptives and dietary fat consumption did not have any discernible interactions on the health indicators assessed in the current research, it contributes to the existing body of knowledge concerning women's health and the potential impacts of contraceptive choices and dietary habits. The results highlight the need of individualised healthcare advice and the necessity of ongoing study to better understand the intricate interactions between hormonal contraception, dietary factors, and women's cardiovascular and metabolic health. Ultimately, such research endeavors will enable healthcare professionals to offer tailored guidance, promoting optimal well-being and cardiovascular outcomes in women using oral contraceptives.

CONCLUSION

The use of oral contraceptives and dietary fat consumption did not have any discernible interactions that affected normotensive women's blood pressure, cardiovascular reactivity, or glucose tolerance. While there were subtle differences between oral contraceptive users and non-users, as well as those with high and low dietary fat intake, these findings underscore the need for personalized healthcare recommendations. It is crucial for healthcare professionals to consider individual variations and other lifestyle factors when advising women on contraceptive choices and cardiovascular health. Further research with larger, longitudinal studies is warranted to explore the long-term implications of these interactions, ensuring optimal well-being and promoting cardiovascular health for women worldwide.





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