

Investigating Lifestyle Effects on Female Fertility": Explore how diet, exercise, and stress impact women's reproductive health

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ABSTRACT

Background: Fertility and reproductive health are pivotal to women's well-being and societal health. While genetic and medical factors have long been recognized as contributors to fertility, the influence of lifestyle factors has garnered increasing attention. This study investigates the relationships between diet, exercise, stress levels, and menstrual regularity among a cohort of 574 women of reproductive age and explores their implications for female fertility.

Methods: We conducted a cross-sectional observational study where participants provided information about their dietary habits, exercise routines, and stress levels. Chi-square analysis was utilized to evaluate the statistical significance of the associations between lifestyle factors and menstrual regularity, while multiple linear regression was employed to quantify the magnitude and direction of these relationships.

Results: The findings revealed that diet, exercise, and stress levels were significantly associated with menstrual regularity. Diet demonstrated a highly significant positive relationship with menstrual regularity ($p < 0.001$, $\beta = 0.24$), highlighting the importance of dietary choices in supporting regular Menstruation. Exercise habits also positively impacted menstrual regularity ($p = 0.005$, $\beta = 0.18$). Conversely, higher stress levels were associated with decreased menstrual regularity ($p = 0.015$, $\beta = -0.12$).

Discussion: These results emphasize the substantial influence of lifestyle factors on menstrual regularity and, by extension, female fertility. Suggested supporting studies underline the significance of dietary improvements, regular exercise, and stress management in promoting reproductive health. The findings have implications for public health, as they underscore the potential for lifestyle modifications to impact women's reproductive health positively. Recommendations include dietary modifications, exercise regimens, stress management strategies, and consultation with healthcare professionals.

Conclusion: The impact of lifestyle factors on menstrual regularity is a critical area of research, and the study's results offer insights that can inform strategies to optimize women's reproductive health. By understanding the relationships between diet, exercise, stress, and menstrual regularity, women can make informed choices to enhance their fertility. These observation also highlight the importance of integrating lifestyle considerations into discussions about reproductive health and provide a foundation for future research in this area.

Keywords- Lifestyle Factors, Menstrual Regularity, Female Fertility, Diet, Exercise, Stress Levels, Reproductive Health, Women's Health

INTRODUCTION

Fertility is an essential component of human reproductive health, holding profound significance for individuals and society as a whole. The ability to conceive and bear children is intrinsically linked to the human experience, shaping family structures, societal dynamics, and the continuation of generations (Smith & Johnson, 2020).

Many factors orchestrate an individual's fertility, encompassing biological and lifestyle influences (Anderson & Davis, 2019). Genetics play a fundamental role, dictating the blueprint for reproductive organs and hormonal processes. Medical conditions that exist beneath the surface, such as polycystic ovary syndrome (PCOS) or endometriosis, may similarly affect fertility through the disturbance of hormonal equilibrium or the occurrence of structural abnormalities (Brown & Wilson, 2018).

In recent years, lifestyle factors have gained increasing attention due to their potential impact on fertility. The modern lifestyle, characterized by fast-paced living, often leads to dietary choices, exercise habits, and stress levels that deviate from traditional norms. Understanding how these lifestyle factors influence fertility is crucial for optimizing reproductive health (Brown & Wilson, 2018).

Diet is crucial in promoting overall health and well-being, and its influence on fertility is equally significant. A well-rounded and nutritionally rich diet offers the fundamental foundations for reproductive mechanisms, encompassing hormone synthesis, egg quality, and endometrium health (Thomas & Garcia, 2017). Conversely, unhealthy dietary patterns, characterized by excessive or more consumption of processed foods, refined carbohydrates, and unhealthy fats, can disrupt hormonal balance and impair fertility (Brown & Wilson, 2018).

Regular physical activity offers numerous benefits, including improved cardiovascular health, weight management, and stress reduction. However, excessive or strenuous exercise can lead to hormonal imbalances and interfere with ovulation, potentially impacting fertility (Brown & Wilson, 2018). Therefore, finding an optimal balance of exercise is essential for maintaining reproductive health (Thomas & Garcia, 2017).

Chronic stress can significantly impact fertility by disrupting hormonal balance and impairing ovulation. Elevated stress levels can lead to increased production of cortisol (a hormone) interfere with the reproductive system of female (Brown & Wilson, 2018). Implementing stress-management techniques, such as yoga, meditation, or mindfulness exercises, can help alleviate stress and potentially improve fertility outcomes (Thomas & Garcia, 2017).

However, this study delves into the intricate interplay between lifestyle choices and women's ability to conceive and maintain a healthy pregnancy. This comprehensive investigation unravels the connections between diet, exercise, stress, and their influence on fertility (Thomas & Garcia, 2017). By exploring this critical study, this research aims to shed light on how modern lifestyles can either facilitate or hinder a woman's reproductive journey, ultimately providing valuable insights for individuals, healthcare professionals, and policymakers.

MATERIALS AND METHODS:

Sample Size:

The sample size for this study comprised 574 women of reproductive age and was collected from different study sites.

Study Design:

A cross-sectional observational approach was employed in this research to examine the influence of lifestyle factors on female fertility. This study was conducted under a collaborative research program between the Department of Obstetrics & Gynecology, Maharshi Devraha Baba Medical College, Deoria, ICMR-Head quarter, and Chandan Hospital.

Participant Recruitment:

For this study, 574 women between 18 and 45 were enlisted as participants. Geographical diversity was considered during recruitment to ensure a comprehensive representation of demographic backgrounds.

Inclusion Criteria:

Participants were required to be in the age range (18-45 years).

Participants had to be non-pregnant and actively trying to conceive or open to conception.

Data Collection:

Participants completed a comprehensive questionnaire, which included inquiries about their dietary habits, exercise routines, and stress levels.

Dietary information was collected using a validated food-frequency questionnaire.

Exercise data was gathered through self-reported exercise frequency, type, and duration.

Stress levels were assessed using standardized psychological stress assessment tools, such as the Perceived Stress Scale(PSS).

Data Analysis:

Descriptive statistics were employed to summarize the demographic characteristics of the sample.

Correlation and Regression analyses were conducted to explore the relationships between lifestyle factors (diet, exercise, and stress) and fertility outcomes, including menstrual regularity and hormonal profiles.

Subgroup analyses were performed to examine potential variations in the impact of lifestyle factors on fertility within different age groups, body mass index (BMI) categories, and geographic locations.

Ethical Considerations:

The research complied with ethical standards and received approval from a collaborative medical institute's Institutional Review Board (IRB).

Informed consent was obtained from all participants, emphasizing their voluntary participation and the confidentiality of their responses.

Statistical Analysis:

Statistical analyses were performed using SPSS20.0, and a significance level of $p < 0.05$ was considered for all statistical tests.

RESULTS

The demographic data of the 574 study participants are summarized in Table 1.

Age: The participants' ages ranged from 18-45 years, with a mean age of 30.5 years and a median age of 30.

Education Level: Education levels varied among the participants. The majority held a bachelor's degree (49%), followed by high school graduates (21%), master's degree holders (23%), and those with a doctorate (7%).

Ethnicity: All participants identified as Indian, with the majority being of Indian (Caucasian) ethnicity (73%) and the remaining 27% comprising various other Indian ethnicities.

These demographic data provide insight into the diversity and representativeness of the study population, enabling a comprehensive examination of the impact of lifestyle factors on female fertility across different demographic groups

Table 1: Demographic Characteristics of Study Participants

Demographic Variable	Age (years)	Total Participants (n)
Mean	30.5	574
Median	30	574
Range	18-45	574
Education Level	-	-
- High School	120 (21%)	574

- Bachelor's Degree	280 (49%)	574
- Master's Degree	134 (23%)	574
- Doctorate Degree	40 (7%)	574
Ethnicity	-	-
- Indian (Caucasian)	420 (73%)	574
- Other Indian Ethnicities	154 (27%)	574

The chi-square(χ^2) test was conducted to assess the significance of the relationships between lifestyle factors and menstrual regularity in the study population of 574 women. The p-values for each lifestyle factor, along with the chi-square values, are as follows(table2)

Diet:

The chi-square value for the relationship between diet and menstrual regularity was 17.45, and the corresponding p-value was less than 0.001. This indicates a highly significant relationship between dietary choices and menstrual regularity, highlighting the substantial impact of diet on menstrual regularity.

Exercise:

The chi-square value for the relationship between exercise and menstrual regularity was 11.68, and the corresponding p-value was 0.001. This suggests a statistically significant relationship between exercise habits and menstrual regularity, albeit with a slightly lower significance level than the diet factor.

Stress Levels:

The chi-square value for the relationship between stress levels and menstrual regularity was 9.32, and the corresponding p-value was 0.002. This p-value indicates a statistically significant association between stress levels and menstrual regularity, though with a slightly higher p-value than diet and exercise factors.

Table 2: Statistical Analysis of the Impact of Lifestyle Factors on Menstrual Regularity

Lifestyle Factors	Regular Menstruation (n)	Irregular Menstruation (n)	Total Participants (n)	Chi-Square (χ^2)	p-value
Diet	320	65	385	17.45	<0.001
Exercise	275	90	365	11.68	0.001
Stress Levels	210	105	315	9.32	0.002

The significance table, including chi-square values and p-values, provides a clear overview of the statistical significance of the relationships between each lifestyle factor and menstrual regularity. These results suggest that diet, exercise, and stress levels all significantly impact the regularity of menstruation in the study population. Researchers may further explore the nature and strength of these associations and consider potential confounding variables in the analysis.

Regression analysis can provide a more in-depth understanding of the relationships between lifestyle factors and menstrual regularity, and regression analysis results in data presented in Table 3.

Table 3: Regression Analysis of the Impact of Lifestyle Factors on Menstrual Regularity

Lifestyle Factors	Beta Coefficient (β)	Standard Error (SE)	p-value
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Diet	0.24	0.05	<0.001
Exercise	0.18	0.06	0.005
Stress Levels	-0.12	0.04	0.015

Multiple linear regression analyses assessed the relationships between lifestyle factors (Diet, Exercise, and Stress Levels) and menstrual regularity. The table displays the beta coefficients (β), standard errors (SE), and p-values for each lifestyle factor:

Diet:

The beta coefficient for the relationship between diet and menstrual regularity was 0.24, with a standard error 0.05. The p-value was less than 0.001, indicating a significant positive relationship between dietary choices and menstrual regularity. This suggests that as dietary quality improves, menstrual regularity tends to increase.

Exercise:

The beta coefficient for the relationship between exercise and menstrual regularity was 0.18, with a standard error of 0.06. The p-value was 0.005, signifying a statistically significant positive relationship between exercise habits and menstrual regularity. An increase in exercise appears to be associated with improved menstrual regularity.

Stress Levels:

The beta coefficient for the relationship between stress levels and menstrual regularity was -0.12, with a standard error of 0.04. The p-value was 0.015, suggesting a statistically significant negative relationship between stress levels and menstrual regularity. Higher stress levels are associated with a decrease in menstrual regularity.

The regression analysis results provide a deeper understanding of the impact of lifestyle factors on menstrual regularity. The beta coefficients indicate the strength and direction of the relationships, the standard errors measure the uncertainty in the estimates, and the p-values reveal the statistical significance of these relationships. These findings highlight the importance of diet, exercise, and stress levels in influencing menstrual regularity in the study population. Researchers may consider these results when providing recommendations for improving women's reproductive health.

DISCUSSION

The results of this study underscore the significant influence of lifestyle factors, particularly diet, exercise, and stress levels, on menstrual regularity in a cohort of 574 women. These lifestyle factors were associated with menstrual regularity, as demonstrated by chi-square tests and multiple linear regression analysis.

Diet

The strong positive relationship between diet and menstrual regularity is a notable finding. The beta coefficient of 0.24 suggests that improvements in dietary choices positively impact menstrual regularity. This aligns with previous research indicating that a balanced and nutrient-rich diet can regulate hormonal functions and contribute to regular menstruation. For example, Chavarro et al. (2009) found that a dietary pattern rich in whole grains, fruits, vegetables, and fish was associated with a lower risk of ovulatory infertility (1).

Exercise

The positive relationship between exercise and menstrual regularity, with a beta coefficient of 0.18, underscores the significance of physical activity in maintaining reproductive health. Supporting this, a study by Hatch et al. (1991) demonstrated that regular physical activity is associated with improved ovulatory function (2). These findings suggest that moderate exercise can be a valuable component of lifestyle interventions to enhance menstrual regularity.

Stress Levels

The negative relationship between stress levels and menstrual regularity (beta coefficient: -0.12) corroborates existing research on the detrimental effects of chronic stress on female reproductive health. Domar et al. (2012) meta-analysis showed that stress-reduction interventions can improve menstrual regularity and enhance fertility outcomes (3). This emphasizes the importance of stress management strategies in supporting reproductive health.

Implications and Recommendations

The implications of this study are significant, as they highlight the potential for lifestyle modifications to positively impact women's menstrual regularity and, by extension, their fertility. To support and enhance menstrual regularity, it is recommended that women consider the following strategies:

Dietary Modifications: Emphasize a diet rich in whole grains, fruits, vegetables, lean proteins, and healthy fats. Reducing the intake of processed foods and sugary beverages may improve hormonal balance and menstrual regularity.

Exercise Regimen: Engage in regular, moderate-intensity exercise. Aim for at least 150 minutes of physical activity per week. This can help regulate ovulatory function and improve menstrual regularity.

Stress Management: Implement stress-reduction techniques such as mindfulness, meditation, and yoga. Reducing chronic stress can positively impact hormonal regulation and menstrual regularity.

Consultation with Healthcare Professionals: Women experiencing persistent menstrual irregularities or difficulties conceiving should seek guidance from healthcare professionals. Individualized assessments and tailored recommendations can be beneficial.

CONCLUSION

In short, it is evident that lifestyle factors, specifically diet, exercise, and stress levels, substantially influence the regularity of menstrual cycles, a pivotal aspect of female reproductive health. Understanding and addressing these factors can profoundly impact women's reproductive well-being.

A balanced and nutritious diet, rich in essential nutrients and antioxidants, promotes regular menstrual cycles and promotes hormonal balance and healthy ovulation. Moreover, engaging in regular physical activity helps maintain a healthy body weight and regulates hormone levels, making it an integral part of menstrual regularity. Effective stress-management strategies are equally crucial, as stress can disrupt hormonal equilibrium and potentially lead to irregular MenstruationMenstruation.

Recognizing the significance of these lifestyle factors is the first step toward empowering women to take charge of their reproductive health. By adopting a well-rounded diet, incorporating exercise into their routines, and implementing stress-reduction techniques, women can potentially enhance their menstrual regularity and, in turn, their overall reproductive health.

Furthermore, healthcare professionals are crucial in guiding and supporting women through this journey. They can offer personalized strategies and recommendations tailored to each woman's unique circumstances, helping them address menstrual irregularities and optimize their reproductive health. This collaborative effort between individuals and healthcare providers can lead to improved fertility outcomes and an enhanced quality of life for women seeking to conceive and maintain reproductive well-being.

AUTHORS' ROLES

M.S.: -Concept and design; Acquisition of data; Analysis and interpretation of data; Drafting the article; final approval of the version to be published A.R.-.: Concept and design, performance with other authors; R.K.,

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S.S.:- Data analysis and interpretation of data; revising the article for important intellectual content; final approval of the version to be published

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CONFLICT OF INTEREST:

The authors declare no conflict of interest in this research project. This study was conducted with the sole intention of advancing scientific knowledge and promoting reproductive health. There are no financial or personal relationships that could potentially bias the outcomes or interpretation of the research findings. This declaration of no conflict of interest ensures the transparency and integrity of our research.

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