

Investigating the association of the lifestyle of pregnant women with the rate of preterm labor

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ABSTRACT

Introduction: From a long time ago, preterm birth has posed life-threatening risks due to the significant complications it causes. The present study aimed to examine how the lifestyle of pregnant women is related to the incidence of preterm birth. **Materials and Methods:** For this cohort study, a total of 234 individuals with healthy and unhealthy lifestyles who visited the women's clinics of Azad University hospitals during the year 2021 were randomly selected to participate. Four criteria were utilized to build lifestyle questionnaires, which included smoking habits, physical activity levels, consumption of high-fiber foods, and sufficient sleep. According to the individuals' responses, 117 mothers who scored above 14, and 117 mothers who scored below 14 were followed up. The SPSS version 25 (SPSS Inc., Chicago, Ill., USA) was used to analyze the correlation between variables and preterm birth, employing statistical tests such as Mann-Whitney, Chi-square, and independent *t*-test. **Results:** In this study, the mean age of the examined women was 27.11 ± 3.19 . Out of the total number of babies, 133 (56.8%) were females, while 101 (43.2%) were males. The *P* value for the association between lifestyle and preterm birth was less than 0.0001, indicating statistical significance. The difference between the consumption of tobacco, fruits, and vegetables and sufficient sleep with preterm birth was not statistically significant (*P* value >0.05). **Conclusion:** A healthy lifestyle can serve as an important preventive measure against preterm birth. Adequate education provided by the healthcare and treatment system plays an important role in promoting the adoption of a healthy lifestyle and benefiting from its positive outcomes.

Keywords: Lifestyle, mortality, pregnancy, preterm birth

Introduction

Women with the intention of pregnancy often consider preterm birth as a significant concern. Preterm birth can result in severe health complications or even mortality for both pregnant women and fetuses.^[1,2] Preterm birth is a significant issue that can arise during pregnancy which can cause significant consequences, including the birth of a premature baby and associated complications. Normally, pregnancy lasts for about 40 weeks. Preterm birth occurs when labor pains begin before

the 37th week of pregnancy and the baby is born with a weight less than 2500 g.^[3,4] According to official statistics, approximately 15 million premature infants are delivered worldwide each year, which is equivalent to one in ten births. The incidence of preterm birth varies among individuals based on their economic and social status. Additionally, two-thirds of perinatal deaths are linked to preterm birth.^[5] Numerous research studies are available on the physiology of labor as well as preterm birth. Although there are modifiable risk factors associated with preterm birth, the main cause of this phenomenon is still unknown, and ongoing discussions suggest potential theories.^[6]

The management of pregnant women who are at risk of preterm birth is crucial and involves several interventions. These interventions include bed rest and hydration, the administration

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of tocolytic drugs to decrease uterine activity, the use of glucocorticoids to promote fetal lung maturation and prevent respiratory distress, treatment of infections such as group B streptococcus, and neonatal intensive care unit care for the infant.^[7,8] In the United States, progesterone is recommended for women who have a previous history of preterm birth or those who have a short cervix without having a prior history of preterm birth.^[9,10] Pregnancy is associated with a wide range of emotional and psychological states experienced by women. Adapting to the emotional changes and accepting the role of motherhood is a gradual process that necessitates time and social and economic support from the surrounding individuals.^[11] One of the hypotheses proposed regarding the health of both the mother and fetus is the effect of lifestyle on the increment of preterm birth risk. Unhealthy habits have been identified as a significant contributor to the likelihood of delivering a baby with low birth weight or prematurely, as some research studies suggest. The World Health Organization (WHO) defines health not only as the absence of illness or disability. The definition of health, however, encompasses not only physical well-being but also mental, emotional, and social aspects. On the other hand, the definition of quality of life is a more complicated issue. This organization defines the quality of life as an individual's perception of their position in society, taking into account the cultural and value systems that surround them, as well as their personal goals, expectations, standards, and concerns.

Given that the social aspects of lifestyle are among the main factors to consider, it is worth noting that the quality of life for mothers is one potential factor that might impact the likelihood of preterm birth. Along with therapeutic interventions, taking preventative measures can significantly affect the reduction of the incidence of preterm birth. Preventing preterm birth reduces the potential problems and challenges caused by it. Given the importance of this issue, we decided to examine the association between the lifestyle of pregnant women and the incidence of preterm birth in select hospitals. While limited studies have investigated the possible role of lifestyle on preterm birth among Iranian women, there is no consensus on this issue. Therefore, more research should be conducted on this issue.^[12,13]

Materials and Methods

The present investigation is a cohort study that focused on pregnant women who received care at hospitals belonging to the Islamic Azad University. Based on prior research and using the following equation, the study included a total of 234 participants divided into two groups of 117 individuals.

$$N = \frac{[P1(1 - P1)] + [P2(1 - P2)] \times (Z1 - \alpha / 2 + Z1 - \beta)^2}{(P1 - P2)^2} \rightarrow$$

$$N = \frac{(0.15 \times 0.85) + (0.30 \times 0.70) \times 7.8}{(0.15)^2} \rightarrow N = 117$$

The study's inclusion criteria consisted of particular lifestyles, singleton pregnancies, and uncomplicated pregnancies.

Furthermore, the exclusion criteria included the patients who were unwilling to participate, those with an inappropriate medical history, individuals younger than 18 or older than 45, and those with any systemic or underlying illnesses. This study employed a non-probability sampling method, with the necessary data extracted from the patient's medical records. To gather data, the study utilized observation, sampling, and a quality-of-life survey conducted through a questionnaire.

The study used an observational approach and was conducted as a cohort investigation, involving the evaluation of 234 pregnant women with singleton pregnancies who received care at Tehran Azad University hospitals. The study analyzed two groups, one with a healthy lifestyle and the other with an unhealthy lifestyle. The healthy lifestyle group was characterized by individuals who slept for at least 7 h per night, consumed high-fiber foods and fruits, ate more than three servings of vegetables daily, engaged in at least 30 min of physical activity every other day, and did not smoke cigarettes or use hookah. Conversely, the unhealthy lifestyle group consisted of individuals who slept for less than 7 h per night, consumed less fiber and fewer than three servings of fruits and vegetables per day, engaged in no more than 30 min of physical activity daily, and smoked cigarettes or used hookah. A checklist was used to gather necessary demographic information, including the mother's age, the baby's gender, family history, and body mass index (BMI). The rate of preterm birth (defined as delivery between weeks 20 and 36 of pregnancy) was monitored and recorded for both groups and compared. Each individual's lifestyle was evaluated and scored based on the data provided by the pregnant women. Healthy lifestyle choices, such as sleeping for at least 7 h per day, consuming at least three servings of fruits and vegetables, engaging in physical activity as previously mentioned, and not smoking, were assigned a score of 5. If an individual engaged in physical activity for more than the previously mentioned duration or consumed high-fiber foods, a score of 7 was assigned. Smoking and insufficient sleep were not awarded any points. Individuals were grouped based on their average score, which was 14.

Data analysis

The statistical data analysis was done using SPSS version 5 (SPSS Inc., Chicago, Ill., USA). The moderator created a questionnaire in which information on various factors such as demographics and quality of life were recorded for all individuals. The statistical analysis was divided into two sections: descriptive and analytical. The descriptive section reported the mean of the desired variables. In the analytical section, statistical assumptions were established using both parametric and non-parametric proportional tests. Qualitative findings were analyzed using the Chi-square test, while the independent *t*-test was employed for comparing quantitative data. When the initial assumptions, such as normality, were not satisfied, the Mann-Whitney U test as a non-parametric alternative test was utilized. To calculate the correlation coefficient, Pearson and Spearman correlation methods were used. All tests were conducted at a significance level of 5%. The mean, median,

standard deviation, minimum and maximum values, and range were measured for the data registration scores. The data are reported as mean ± SD (standard deviation).

Results

According to the findings of this study, out of 234 participants, 133 were female, and 101 were male babies. This indicates that females constituted 56.8% of the total study population, while males accounted for 43.2%. The comparison between the gender of babies and lifestyle revealed a significance level of 0.5, indicating a lack of significant difference between them. The significance level measured for the comparison between preterm birth and the gender of newborns was less than 0.001, suggesting a significant difference between these variables. Table 1 presents the results indicating that the possibility of preterm birth was 60% lower in female babies compared to male babies.

The study found that 84.1% of the participants with preterm birth had a family history of the same condition. The significance level calculated for the comparison between the gender of newborns and positive family history was less than 0.001, indicating a significant difference between preterm birth and positive family history. Mothers with a positive family history had an 80% higher probability of preterm birth. The findings indicated that 88 babies were born prematurely, while 146 were born at full term. The mean age of the women who participated in the study was 27 years [Figure 1].

The significance level measured for the comparison between preterm birth and maternal age was 0.16, indicating a lack of significant difference between them. The Kolmogorov-Smirnov test revealed that the age variable did not follow a normal distribution. As a result, the Mann-Whitney test was used to assess the correlation. A significance level of less than 0.05 was considered acceptable for this study. The mean BMI of the investigated women was 25.96 ± 3.46. The significance level measured for the comparison between preterm birth and BMI

was 0.016, indicating a significant difference between these variables. The Kolmogorov-Smirnov test indicated that the BMI variable did not follow a normal distribution. Therefore, the correlation was measured using the Mann-Whitney test. Twenty of the babies born prematurely and 97 babies born at full term had mothers with a healthy lifestyle. The significance level measured for the comparison between lifestyle and preterm birth was less than 0.001, suggesting a significant difference between these variables. Table 2 shows that the probability of preterm birth was 70% lower among women with positive healthy lifestyles. The results concerning the lifestyle scores of the studied women showed an average score of 14.9, with the lowest score being 4 and the highest score being 24.

The significance level measured for the comparison between preterm birth and maternal smoking was 0.29, indicating a lack of significant difference between these variables. The significance level measured for the comparison between preterm birth and mothers' vegetable consumption was 0.252, indicating a lack of significant difference between the mentioned variables. The significance level measured for the comparison between sleep duration and preterm birth was less than 0.001, indicating a significant difference between these variables. Women who had enough sleep had a 40% lower probability of preterm birth.

Discussion

Lifestyle is a general term that is defined within a specific framework comprising various criteria. Important factors that contribute to lifestyle include people's eating habits, exercise routine, social status, physical appearance and condition, gender, as well as psychological and physical characteristics.^[14] Here, we briefly reviewed several criteria to determine whether a lifestyle was healthy or unhealthy based on the points given to individuals for each of these factors. The factors considered include BMI, a healthy eating pattern characterized by the consumption of at least three servings of vegetables per day and the avoidance of

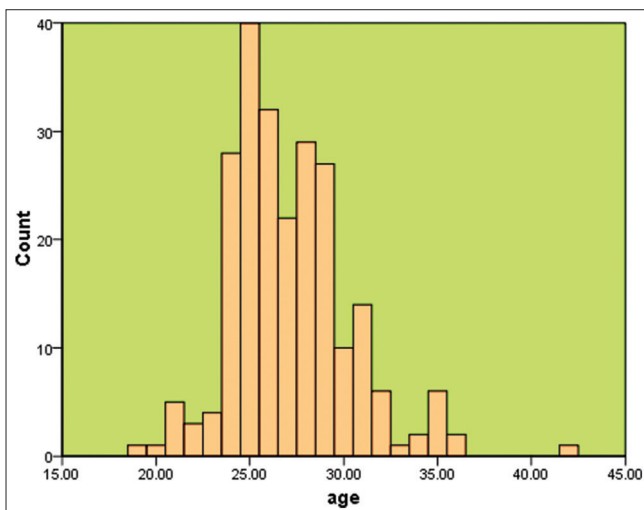


Figure 1: The frequency distribution of women based on age

Table 1: Frequency distribution of newborn gender based on lifestyle and preterm birth

Items	Male		Female	
	Percentage	Frequency	Percentage	Frequency
Lifestyle				
Healthy	49.5	50	49.6	66
Unhealthy	50.5	51	50.4	67
Preterm birth				
Yes	57.4	58	22.6	30
No	42.6	43	77.4	103

Table 2: The lifestyle of women and preterm birth

	Healthy lifestyle		Unhealthy lifestyle	
	Percentage	Frequency	Percentage	Frequency
Preterm birth				
Yes	17.1	20	58.1	68
No	82.9	97	41.9	117

fast food, sufficient sleep, and regular physical activity. Given that the present cohort study was not conducted over a prolonged period and it was not possible to examine all the available criteria for a healthy lifestyle, the most important factors and indicators were discussed.

In Iran, approximately one in ten women experience preterm birth each year. This event not only prevents the complete development of the fetus but also leads to fetal complications and various maternal consequences. Preterm birth can cause additional complications in certain maternal contexts. As the old saying goes, "Prevention is better than cure." By providing adequate information about preterm birth and taking necessary measures to control it, many of its consequences can be avoided.^[15] The lifestyle of mothers has always been a topic of interest. Mothers, even those with the lowest economic and social status during pregnancy, try to have healthier lifestyle practices compared to their normal routines. However, the effectiveness of such compliance in preventing preterm birth as a major complication of pregnancy remains a concern. The healthcare system has a specialized focus on the care of women and children. The well-being of mothers and the birth of a healthy child are of utmost importance in the healthcare system.^[16]

The research conducted in Italy did not show any significant difference in preterm birth rates between the two groups examined. One explanation for this finding could be the involvement of lifestyle modifications. Modifying people's lifestyles to conduct a study can even serve as a factor or a stimulus. According to TAKAMI's 2018 research, which did not involve any intervention in the participants' lifestyles, high levels of physical activity increase the incidence of preterm birth due to factors such as placental abruption, underlying medical conditions of women, and complications during pregnancy.^[13] It is evident that maintaining a healthy lifestyle can have a positive effect on reducing the risk of preterm birth. Studies that do not involve any modification to the individuals' lifestyles and allow them to continue with their usual routines are likely to yield more reliable results.

As previously mentioned, accurately implementing a healthy lifestyle is not easy. Besides, the specific aspect of a healthy lifestyle that researchers focus on can affect the results of the study. For instance, Maisonneuve *et al.* conducted research on the relationship between preterm birth and the consumption of fruits and vegetables, and tobacco. Individuals who smoked or used drugs had a significantly higher incidence of preterm birth compared to those who did not, whereas the consumption of multiple servings of fruits and vegetables did not exhibit a significant correlation with the rate of preterm birth. According to American researchers, having a healthy lifestyle is a significant factor in decreasing the risk of preterm birth in women. They identified two key factors, namely, enough sleep and a healthy diet, as the most influencing factors.^[17] An Iranian study compared women with preterm birth with those with full-term birth. The study found a statistically significant difference between the mean

scores of dietary habits, smoking, alcohol use, social relations, and pregnancy care, and the incidence of preterm birth.^[18] Thus, it is crucial to provide health education and appropriate recommendations regarding having a healthy lifestyle, especially during pregnancy.

In some studies, only one aspect of a healthy lifestyle is examined, although there may be other variables with confounding effects. However, through this approach, the correlation of a particular variable is evaluated more precisely. Undoubtedly, it is challenging to investigate all the effective factors and people's lifestyles in a research study. A study has examined the use of a set of neuromuscular exercises as an independent factor in addressing issues and complications during pregnancy and childbirth, and its positive effects have been examined.^[19] This study found no significant difference in the number of male and female babies, which can greatly reduce the effect of gender as a confounding factor. As per this study, preterm birth was observed to be significantly more common in male infants. The absence of a correlation between lifestyle and the gender of babies may be explained by the determination of babies' gender at the time of conception, which is a separate factor from the effect of a person's lifestyle during pregnancy. The increase in the incidence of preterm birth in pregnant women with a positive family history suggests the role of genetics in affecting the individual and elevating the risk of preterm birth in these women.

Mothers' BMI was evaluated as an indicator of their lifestyle. From a statistical point of view, obese women had a notably higher potential for preterm birth. Management of weight during pregnancy is an important factor in prenatal care. Maintaining an optimal weight is a significant factor in decreasing the risks and complications of pregnancy, as observed in this study. Consumption of fruits and vegetables was found to have no significant effect on the incidence of preterm birth in either group, which can be attributed to the types of food consumed in the main meals. Physical activity was not found to have a significant effect on preterm birth in the participants. Therefore, studies that associate an increase in physical activity with a rise in preterm birth should consider a broader spectrum of physical activity, including engaging in heavy sports. Maternal smoking was not found to have a statistically significant effect on preterm birth. Thus, this can be due to the low number of smokers among the women included in the study. Several studies have evaluated the correlation between smoking and preterm birth, and a majority of them have confirmed the negative effect of smoking on the incidence of preterm birth. Finally, the women's lifestyle scores were evaluated in relation to the incidence of preterm birth. Having a healthy lifestyle can prevent preterm birth and significantly decrease the potential for pregnancy complications.

Conclusion

Pregnant women are strongly advised to receive education and instruction on how to have a healthy lifestyle. Providing comprehensive information on various aspects of a healthy

lifestyle, including physical, cultural, social, and economic factors, can positively decrease the incidence of preterm birth, particularly among Iranian women.

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Conflicts of interest

There are no conflicts of interest.

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