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A Comparison between Dietary Habits for Pregnant Women with Preterm and Term Delivery in Khorasan, Iran

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Abstract

Background: Despite the advances in prenatal care and improving health indicators, preterm delivery and resultant infant mortality rate are still considerable. Emerged financial, social, mental and emotional damages could result in mental and behavioral disabilities for mothers as well as children. Although spontaneous preterm labor is well known as a multifactorial issue, yet poor nutrition is assumed as a strong related factor. Objective: To identify the role of dietary habits on preterm delivery prevalence in Iran, this study was conducted on pregnant women with preterm and term delivery. Methods: In this retrospective case-control study, 70 women with preterm labor and 70 women with term labor were compared in terms of their dietary habits. Women who met the inclusion criteria and referred to two hospitals in North-East of Iran were selected using purposive convenience sampling method and completed 163-item food frequency and dietary habits questionnaire. Results: This study showed that dietary habits of women with preterm labor are more unfavorable compared to women with term labor (P = 0.023). Generally, dietary habit of more than half of the women with preterm labor, in this study, was assessed unfavorable. In terms of different food groups, daily intake of vegetables was significantly lower in women with preterm labor (P = 0.02). Consumption of dairy products was also lower in women with preterm labor than

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women with term labor which was significant (P = 0.05). Conclusion: To prevent adverse outcomes of preterm delivery more attention regarding nutritional planning for pregnant women seems to be essential.

Keywords

Dietary Habit, Preterm Delivery, Pregnancy

1. Introduction

Despite the advances in prenatal care and improving health indicators, yet 5% - 10% of all pregnancies are terminated as preterm, and prematurity is still the leading cause of neonatal mortality in developed and developing countries [1] [2]. Preterm infant is defined as the infant who is born before 37 completed weeks of pregnancy [3].

Prevalence of preterm delivery was estimated about 14.9 million globally. About 60% of this occurs in South Asia and sub-Saharan Africa, 18% in African countries, 5% in Europe and 11.1% in the rest of the world [4]. Obviously, higher prevalence of spontaneous preterm labor occurs in poorest countries where people are assumed to be under-nourished [5]. Approximately, 57% of neonatal death occurs at the first month of birth and 36% of them is attributable to preterm delivery [6]. Adverse outcomes of preterm delivery are considered as the greatest social and economic problems causing mental and behavioral disabilities [7].

Multiple pathologic processes such as length of cervix, preeclampsia and maternal stress may be associated with preterm delivery [8] [9] however poor nutrition is still assumed as a substantial related factor [10]-[12]. Based on literature, insufficient intake of food during pregnancy not only leads to increased risk of preterm delivery, fetal growth restriction and low birth weight [13]-[15], but also declined mother's health [15]. Nutritional needs increase during pregnancy due to the fetus growth, placenta, breast and uterus enlargement, increased body fat and blood volume [16]. Therefore, the quantity and quality of nutrition during pregnancy are of particular importance [15].

On the other hand, this is evident in a systematic review that food intake has no effect on preterm birth rate [17].

Since the impact of nutrition during pregnancy on preterm delivery is still controversial, we decided to investigate and compare the pregnant women's nutritional condition in two groups of preterm and term delivery.

2. Methods and Materials

Using a purposive convenience sampling method, 140 women who attended Social Security and Nohome Dey Hospitals and met inclusion criteria were recruited from October 2013 to October 2014. 70 participants were being hospitalized with a diagnosis of preterm delivery and 70 participants had term delivery. The proper sample size was estimated in consultation with a biological statistician (Equation (1): Correlation formula).

$$n \geq 2\frac{\left(z_{\alpha}+z_{\beta}\right)^{2}\sigma^{2}}{\left(\mu_{1}-\mu_{2}\right)^{2}} \quad (1)$$

The study settings were public and referral hospitals located in a city in North-East of Iran.

Women who were between 18 and 35 years of age, Iranian, without any severe trauma or stress leading to preterm delivery were included in this study. They also should have no history of preterm labor and chronic diseases. The selected participants should not be smokers and medication recipients.

Data were collected through face to face interviews by the first author and each interview last about half an hour. Prior to each interview commencement, written consents collected followed by completion of the demographic and obstetric questionnaires. These data were collected after delivery and determining gestational age of the neonate (based on early pregnancy sonography and the neonate's appearance). Nutritional status of the women during recent 12 months was assessed by 168-item food-frequency questionnaire (168-FFQ). Ethics approval was obtained of Shahid Beheshti University and the study settings Ethics Committees.

168-FFQ contains 168 food items with a standard serving size for each food product. The participants were asked to report their consumption frequency of each food product according to standard serving size. Depending on the type of food, the consumption frequency was asked and reported on daily, weekly, monthly and yearly basis. According to the Food Pyramid Guide, then, food items were placed in five major food groups (bread and cereal, vegetables, fruits, dairy, meat and beans).

Standard unit that was considered for daily use for each of the five major food groups was in accordance with the pregnancy nutrition guideline of the Health Ministry of Iran. Dietary habit was considered favorable if daily intake of food products in 4 - 5 main food groups was in accordance with the guideline. Otherwise, it was considered unfavorable. It means that women who intake daily 3 - 4 unit fruits, 7 - 10 units bread and cereals, 4 - 5 units vegetables, 3 - 4 units meat and beans and 3 - 4 units dairy were placed in favorable dietary group.

Validity of 168-FFQ has been determined in previous studies with Spearman coefficient mean of 0.80 [18] [19]. Moreover, reliability of that has been determined examined in previous studies (r = 0.59) [18].

Data analysis:

The collected data from each participant was statistically analyzed using Statistical Package for the Social Science version 22 (SPSS22). The descriptive statistics (frequency-percent, mean ± SD) of Mann-Whitney, chi-square and t-test were used to analyze the collected data. Normal distribution was checked in consultation with a biological statistician. $P < 0.05$ was considered significant.

3. Results

In this study, participants had a mean age of 29 ± 5.7. Most participants, 90 (64.3%), had education level less than diploma, 35 (25%) diploma, and only 15 (10.7%) had an academic education. 12 (8.6%) of the participants' husbands were illiterate, 79 (56.4%) less than diploma, 35 (25%) diploma, and only 14 (10%) had an academic education. Most women 130 (92.9%) were house wives and 10 (7.1%) were employed. Most of the participants in both groups, 86 (more than 60%) were living in urban areas (**Table 1**). In addition, demographic characteristics of women in preterm and term delivery groups were compared using Chi-square test. Accordingly, there was no significant difference between two groups in terms of each character ($P > 0.05$).

In terms of family income, 60% of women with preterm delivery and about half of women with term delivery (48.6%) were categorized in low-income families. Mann-Whitney test showed that the difference between two groups in terms of family income was significant ($P = 0.05$).

Regarding their obstetric characteristics 21.4% experienced their first pregnancy; nearly half (47.9%) were in their second pregnancy; and 25% were in third pregnancy. 36.5% of participants had a history of abortion, 55.1% had intervals less than 4 years with their last pregnancy or abortion.

Respect to participants' BMI prior to pregnancy, there was a significant difference between two case and control groups ($P = 0.01$). Women with lower BMI at the beginning of pregnancy had the higher possibility of preterm delivery (**Table 2**). Notably, about half of women in case group reported an unfavorable dietary habit during pregnancy.

Nutritional status in two case and control groups has been shown in **Table 3**. Evaluation of dietary habits in two groups showed that women with preterm delivery had more unfavorable dietary habits during pregnancy than women with term delivery ($P = 0.023$).

Based on the Health Ministry guideline, daily intake of vegetables was less in women with preterm delivery than women in control group (**Table 4**). The results of chi-square test showed a significant difference between two groups in terms of daily intake of vegetables ($P = 0.01$). A significant difference also was recognized in terms of dairy intake in two groups ($P = 0.05$) while bread, fruit, meat and beans consumption seems to not be different significantly in two groups ($P > 0.05$).

Moreover, 60% and 50% of women with preterm and term delivery, respectively, intake 3 or less food groups on a daily basis. This was emerged from this study that about one third (32.9%) of women in both groups intake only one food group. Notably, 4.3% of women in case group didn't consume food products according the guideline (**Table 5**).

4. Discussion

Unfavorable dietary habits were relatively sensible in women with preterm delivery. There are some studies that affirm this study's findings. In a study by Kamalifard *et al.* (2010), food consumption in term delivery group is

Table 1. Demographic characters of participants.

Age (year)	N (%)	Mean ± SD
<20	12 (8.5)	29 ± 5.7
20 - 24	46 (32.8)	
25 - 29	31 (22.3)	
≤30	51 (36.9)	
Education		
Lower than Diploma	90(64.3)	
Diploma	35 (25)	
Higher than Diploma	15 (10.7)	
Education (Husband)		
No Education	12 (8.6)	
Lower than Diploma	79 (56.4)	
Diploma	35 (25)	
Higher than Diploma	14 (10)	
Occupation		
Housewives	130 (92.9)	
Employed	10 (7.1)	
Monthly Income		
<6,000,000 R	21 (15)	
6,000,000 - 9,000,000 R	55 (39.3)	
>9,000,000 R	64 (45.7)	
Residential Area		
City	86 (61.4)	
Rural	54 (38.6)	

Table 2. Distribution of body mass index of participants.

Body Mass Index before pregnancy		P-value
Preterm	Term	
22/33 ± 2/78	23/34 ± 2/09	P = 0/01

Table 3. Comparison of dietary habits between two groups of preterm and term delivery.

	Delivery		P-value[1]
	Preterm	Term	
Unfavorable	45 (64.3%)	32(45.7%)	0.023
Favorable	25 (35.7%)	38(54.3%)	

[1]The chi-square test was used.

Table 4. Comparison and frequency distribution of food groups' intake between two groups of preterm and term delivery.

food groups	Delivery		P-value
	Preterm	Term	
Bread	57 (81.4)	57 (81.4)	1.00
Fruit	33 (47.1)	39 (55.7)	0.31
Vegetable	26 (37.1)	40 (57.1)	0.01
Dairy	40 (57.1)	50 (71.4)	0.05
Meat and beans	47 (67.1)	42 (60.0)	0.38

The chi-square test was used

Table 5. Comparison and frequency distribution of food intake between two groups of preterm and term delivery.

Number of consumed food groups	Delivery		P-value
	Preterm	Term	
None	3 (4.3)	0	0.391
One case	13 (18.6)	10 (14.3)	
Two cases	12 (17.1)	9 (12.9)	
Three cases	14 (20.0)	16 (22.9)	
Four cases	16 (22.9)	23 (32.9)	
Five cases	12 (17.1)	12 (17.1)	

The chi-square test was used

more favorable than preterm delivery group [20]. Another study on women with twin pregnancies showed a significant relationship between appropriate nutrition along with regular prenatal care and decrease of preterm delivery prevalence [21].

About the importance of nutrition, it should be noted that the woman's body during pregnancy needs very various food products with adequate calories. Growth of the fetus, placenta, uterus and breasts and increasing the blood volume demand different food products especially protein. Lack of adequate and qualified nutrition causes health problems for the mother and fetus and considerably increases the risk of preterm delivery and resultant adverse outcomes for mothers and children [22] [23].

Comparison of daily intake of five major food groups indicated that vegetable intake was significantly lower in women with preterm delivery than other counterparts in term delivery group. This is well documented by previous studies that Mediterranean diet which is rich in fruits, vegetables, fish and olive oil could reduce the incidence of preterm delivery [24]-[26] due to antioxidants [27] by preventing the damaging effects of oxidative stress along with protection of the connective tissues and increase the strength of membranes [28]. So, concerning this fact that about half of preterm deliveries are resulted from premature rupture of membranes, consumption of vegetables should be of importance [29].

Awareness of the benefits of taking these food groups may increase the tendency to use them. Along with vegetables, milk and dairy consumption also seems to be of importance due to the influence of calcium deficiency on membrane permeability and uterus contractions that may contribute to preterm delivery [30].

Contrary to this study, Bakhtiari *et al*. (2007) concluded that the majority of pregnant women have relatively favorable dietary pattern during pregnancy [31]. However, others assessed pregnant women's dietary habits moderate and less than standard [32] [33]. This inconsistency may relate to the different regions of studies. The Bakhtiari's study was conducted in north of Iran where is green and rainy and food products are varied and affordable while this study was undertaken in an arid area where vegetables are expensive to afford.

According to the present study, the majority of women in case group had unfavorable dietary habits that can be attributable to their low socio-economic status and resultant low awareness of nutrition requirements during pregnancy [33]. This is documented that higher socio-economic status may improve pregnant women's health and decrease adverse effects of poor diet through increase the knowledge and life skills [34] although this study has found only a nearly significant relationship ($P = 0.08$). However better dietary habits and term delivery could be attributable to higher socio-economic status [35]-[38], relationship is still controversial [20].

Having a higher BMI prior to pregnancy has a determining role in gestational age at the delivery time [39]. Inability to afford adequate food resources as a result of low socio-economic status may continue during pregnancy and contribute to restricted fetal growth and preterm delivery [40].

Generally, we expected to find some relationship between observing the daily intake of food groups and reduction of prevalence of preterm delivery. However we found this relationship, studies that confirm the current findings are still rare. Inconsistencies between the current study and Bakhtiari study in a same country [31] overshadow the results of both studies. So, further studies are worthwhile to cover limitations with this study. A limitation of this study is related to the memory of the participants. Since dietary habits were assessed by food frequency questionnaire for one year, the participants might not remember all the used food products. Another limitation is due to convenience sampling method. Further randomized control studies should be conducted to affirm the results of this study and make them generalizable to all Iranian pregnant women.

This study, however, was the first study conducted to explore relationship between dietary habits of pregnant women and prevalence of preterm delivery in Iran.

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