

## Risk Factors Causing Preterm Labor

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**OBJECTIVE:** The aim of this study was to determine the risk factors, that may cause preterm labor among the pregnant women.

**STUDY DESIGN:** Our study was performed between the dates 1<sup>st</sup> September 2008 - 1<sup>st</sup> May 2009, among pregnant women, who are hospitalized in Obstetrics and Gynecology Department of Bülent Ecevit University Faculty of Medicine. A survey sheet was constituted to determine possible risk factors of preterm labor.

**RESULTS:** Variables, which were evaluated as significant according to Logistic Regression Analysis, were found as age, systolic blood pressure, multiple pregnancies, presence of chronic disease, anemia, intercourse, experiencing a bitter event within the last month, trauma, low income and leukocytosis.

**CONCLUSIONS:** Conditions related to low socio-cultural level, high blood pressure, stress, multiple pregnancies, therapeutic pregnancies, vaginal infections, presence of a chronic disease, or severe anemia led us to suspect about preterm labor; risk factors should be eliminated by intensive monitoring of these pregnant women.

**Key Words:** Preterm Labor, Risk factors, And socio-cultural conditions

Gynecol Obstet Rebrod Med 2013;19:7-11

### Introduction

Preterm birth, evoking high perinatal mortality and morbidity rates, is a serious obstetric problem which remains important at the present. Preterm labor stands out responsible for two thirds of premature baby deaths.<sup>1</sup> Prevention of preterm labor is one of the leading goals of obstetrics in order to avoid morbidity, which may evolve depending on prematurity, right along with preventing perinatal and neonatal deaths.<sup>2</sup>

Although it differs depending on risk factors in distinct populations, preterm birth rate average incidence is 10-11%, and has not changed within last 30 years.<sup>3,4,5,6</sup> Despite advanced neonatal care, around 70-80% of perinatal deaths are observed among premature babies when congenital malformations are excluded.<sup>5</sup> One percent of babies which are born between 32-36 weeks, 0.3% of babies which are born between 37-41 weeks have died at the end of first year. Surviving babies spend most of their lives in the hospitals, especially experiencing lung, growth and development problems. Huge amount of money emerges when health expenditures spent for

premature babies are considered; hence prevention of preterm birth contributes to economy by decreasing this amount.

Births occurring before accomplishing 37<sup>th</sup> pregnancy weeks or 259<sup>th</sup> days, with respect to last menstruation date, are designated as preterm births.<sup>4,7,8</sup> Fundamental of preventing preterm labor is accomplished by having good knowledge of risk factors. Considering the fact that world medicine orients towards preventive medicine and assuming preterm labors may decrease when we can avoid preterm labor risk factors, we found it proper to investigate these risk factors in our recent study. We thought that risk factors causing preterm labor might be related to demographic, psycho-social, medical, biological, environmental features. In this study, we aimed to determine risk factors which may cause preterm labor.

### Material and Method

This case-control study was conducted on 240 subjects who were hospitalized between the dates 1<sup>st</sup> September 2008 - 1<sup>st</sup> May 2009 at Obstetrics and Gynecology Department of Z.K.U. Medical Center, Zonguldak, Turkey. Pregnant women were grouped into two. One half of these subjects (120) were selected from the cases who had preterm labor and the other were selected from the ones who had their labors at the expected times. This study was certified by the Ethical Committee of ZKU (No: 2009/05) and all patients accepted and gave informed consent to participate in this study. A survey form was constituted including the factors that we consider as preterm labor risk factors. Survey questions were asked to the pregnant women in the first day after labor and the answers were evaluated. Post natal first day lipid levels, prenatal he-

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Submitted for Publication: 08. 11. 2012

Accepted for Publication: 19. 12. 2012

mogram, fasting blood sugar levels and platelet levels were also recorded. Weight, height and blood pressures of the pregnant women were also measured before the start of labor. These data were also recorded to the survey form and analyzed.

### Statistical analyses

SPSS (version 13.0) (SPSS Inc., Chicago, IL) was used for the analysis of data. Descriptive statistics were given as mean value  $\pm$  standard deviation for the data with normal distribution, as median (lowest and highest value) for the data that does not show normal distribution and as numbers, and percentages for the categorical values. Kolmogorov-Smirnov test was used to test for normality of distribution. Chi square and Fisher Chi square tests were used for the analyses of categorical data, hierarchical log linear analyses were used to evaluate the relationship between three categorical variables. Comparison between two mean values was conducted with significance of difference test when the parametric test probabilities were met and when not with Mann-Whitney U test. Logistic regression analyses were conducted using forward stepwise approach for the determination of risk factors. Results were evaluated within 95% confidence interval and  $p < 0.05$  was accepted as significant.

## Results

Our study was performed between the dates 1<sup>st</sup> September 2008 - 1<sup>st</sup> May 2009, among a group of pregnant women aged between 17 and 46 years. The mean age of the case group was  $28.6 \pm 4.9$  years whereas the mean age of control group was  $27.3 \pm 4.9$  years. In the case group there were 16 pregnant women and in the control 13 pregnant women who were over the age of 35 years. There was not any pregnant woman under the age of 16 in both groups. But in the case group there was a pregnant woman at the age of 17.

In order to evaluate the occupation of the pregnant women jobs were categorized into 3 groups as housewife, civil servant and employee. Of the control group 67.5% were housewives, 28.3% were working as employee and 4.2% as civil servant, whereas in the case group the ratio of the housewife employees and civil servants were 87.5%, 10% and 2.5% respec-

tively. The majority were housewives in both groups.

When the education status of the pregnant women were evaluated; in the control group the ratio of high school graduates were found to be highest (32.5%) where in the case group, elementary school graduates were placed in the highest rank order (60.8%). It was observed that as the education level gets lower, there is an increase in the preterm labor. Distribution of the education status among groups can be found in table I.

The mean body height was 159.2 cm in case group and 160.7 cm in control group. Relationship between shortness and preterm labor were found to be statistically significant. BMI values were found to be similar for both groups.

The mean systolic blood pressure measurements were 124 mmHg for the case group and 108 mmHg for the control, the mean diastolic blood pressures for the case and control groups were 76 mmHg and 68 mmHg respectively. A statistically significant relationship ( $p < 0.001$ ) was determined between the high blood pressure and the preterm labor.

There was not any significant relationship ( $p = 0.8949$ ) in the statistical analyses between artificial fertilization and preterm labor whereas it was observed that multiple pregnancy was effective on preterm labor ( $p = 0.001$ ). Multiple pregnancy ratios were found to be 20.8 % in the case group whereas 0.8 % in the control group.

The relationship between the socioeconomic status of the pregnant women and preterm labor was investigated. Majority in both groups were living in nuclear families. Of the case group 38.3% were living in a patriarchal or extended families whereas this ratio was found to be 19.2% in control group. The difference between the two groups was found to be statistically significant ( $p = 0.001$ ). When income status was evaluated, it was found that in the control group 10.8% and in the case group 59.2 % had incomes lower than 1000 liras. It was found that as the income got lower, the risk of preterm labor got higher.

The history of abortions were present in the 24.2 % of both control and case groups where the relationship between abortion history and preterm labor was not confirmed ( $p > 0.05$ ). It

Table 1: Distribution of education status among groups

Education level	Case group (n=120)		Control group (n=120)		p
	Number	%	Number	%	
Elementary school	73	60.8	36	30.0	<b>&lt;0.001</b>
Secondary school	18	15,0	16	13,3	
High School	17	14.2	39	32.5	
University	12	10.0	29	24.2	
Total	120	100.0	120	100.0	

was found that positive history of preterm labor, preeclampsia, or underweight birth could result in a preterm labor.

In the case group 4.2 % were active smokers, 27.5 % were passive smokers whereas the total of these groups was 10 % for the control group. Fifteen percent of both groups expressed that they were active smokers before the pregnancy. It was observed that smoking increased the risk of preterm labor. It was determined that coffee intake had no effect on preterm labor. Pregnant women in both groups were not consuming alcohol. In table 2 distributions of cigarette and coffee consumption among groups were shown. Amniocentesis was applied to 9 pregnant women in both groups where the relationship between amniocentesis and preterm labor was not statistically significant ( $p>0.05$ ).

When the pregnant women were compared in terms of chronic illnesses, main chronic illnesses observed were diabetes, goiter, hypertension, kidney diseases. According to the logistic regression analyses variables that were determined as statistically significant were age, systolic blood pressure, multiple pregnancies, preeclampsia, presence of chronic illness,

anemia, intercourse, experiencing a sad event within last one month, trauma, low income, leukocytosis (Table 3).

## Discussion

Preterm labor is a multifactorial situation that develops as a result of biological, medical and socioeconomic factors. Low socioeconomic level, inadequate nutrition intake, inadequate prenatal care, lack of education, extramarital pregnancy, infections, substance addiction are the most frequently stated causes in the literature.<sup>2,7,9,10,11</sup> We have examined socio-demographic factors about the motherhood, factors about the medical history, and the present medical health of the mother.

Pregnant women who were included in this study had a mean age of 27.9 years which was almost the same with the other studies on the subject. Gaza reported that risk factors were determined as being older than 35, not attending regularly to the medical controls, history of preterm act and history of cesarean operation.<sup>11</sup> In the present study we also concluded that the risk of preterm labor increased as the age increased. Since our hospital is a university hospital, artificial fertilization

Table 2: Distribution of cigarette and coffee consumption among groups

		Case Group (n=120)		Control Group (n=120)		p
		Number	%	Number	%	
Cigarette	Active smoker	5	4.2	4	3.3	<b>&lt;0.001</b>
	Passive smoker	33	27.5	8	6.7	
	Active smoker before pregnancy	18	15	18	15	
	Passive smoker before pregnancy	6	5	1	0.8	
	Non-smoker	58	48.3	89	74.2	
Coffee	Yes	16	13.3	15	12.5	<b>1,000</b>
	No	104	86.7	105	87.5	

Table 3: Risk factors for preterm labor with logistic regression

Variables	Odds ratio	95% Confidence interval	P
Age	1.156	1.072-1.247	<b>&lt;0.001</b>
Systolic blood pressure	1.061	1.030-1.092	<b>&lt;0.001</b>
Preeclampsia	19.848	3.792-103.900	<b>&lt;0.001</b>
Multiple pregnancy	106.526	11.24-1009.6	<b>0.001</b>
Chronic illness*	3.830	1.302-11.263	<b>0.015</b>
Anemia	2.707	1.331-5.504	<b>0.006</b>
Intercourse	2.823	1.365-5.837	<b>0.001</b>
Experiencing a sad event	16.100	1.817-142.688	<b>0.013</b>
Trauma	49.060	4.602-522.955	<b>0.001</b>
Income lower 1000	18.114	6.037-54.355	<b>&lt;0.001</b>
Income 1000-2000	2.814	1.083-7.304	<b>0.034</b>
WBC	1.000	1.000-1.000	<b>&lt;0.001</b>
Vaginal infection	4.125	1.559-10.913	<b>0.004</b>

of old candidates, old age pregnancy examinations frequently takes place. Any pregnant woman in this group could give a birth to a healthy child on time when closely followed-up. Thus in our study the number of pregnancies with over 35 years old has been found close to each other.

The case and the control groups were different in occupation when socioeconomic properties were evaluated. The numbers of housewives were higher in the case group. In the case group 30% of pregnant women were coming both from Zonguldak whereas in the control group the ratio of pregnant women coming from Zonguldak was 45% and coming from Bartın was 5% respectively. That could be a result of a socio-cultural situation depending on the fact that there were a high number of villages in Bartın City. In addition, cities of Bartın and Zonguldak have been ranked within the first three cities having the highest village population in Turkey<sup>12</sup> In fact these women were working at farm very hardly, they were not real housewives. The relationship between preterm labor and education has been also considered where it was observed in our study that the pregnant women in the case group had lower education levels with 60% of elementary school graduates In the study conducted by Beeckman et.al in 2009 it was emphasized that preterm labor could be related to age and marital status where it was especially a higher risk factor for the women under the age of 16 and single or divorced mothers living without husbands.<sup>13</sup> In our study, due to the socio-cultural structure of Turkey, especially Zonguldak area the ratio of extramarital or under age pregnancies were rather low or even did not exist.

The family type in our study was generally immediate or nuclear family whereas the ones living in patriarchal or extended family type were two times higher in the case group compared to the control group. Since the pregnant women living in nuclear families were in a better socio-economic status; they attended the controls regularly during pregnancy, it was assured that they were well fed and they spent a wise pregnancy period. Also the number of couples without a job was higher in the case group compared to the control group where the income was lower than 1000 liras for more than half of the case group. These families have been living at the edge of starving according to the 2009 data. In our hospital the number of patients coming from rural was high and they have had their houses in the village where they lived together with their parents and did not need to pay rent. In fact preterm labor has been related to the family properties and socio-cultural and economical level. Pregnant women at the low income level were not well fed during the pregnancy, did not show the required care to them and were not attending to medical examinations regularly. In this type of families the contraception methods are not applied resulting in the higher number of pregnancies where the attention given to the pregnancy is lower. Most of these families are living in villages and work-

ing under hard conditions. If we can improve birth or pregnancy follow-up system in our country we could avoid preterm labors or at least start the treatments on time for the coexisting diseases before it reaches the last stage.

There were a lot of studies present in the literature on the relationship between physical properties such as height, weight, BMI and preterm labor. Moore stated that pregnant women under 152,3 cm had an increased risk for preterm labor, Chan and Lao was not able to establish any relationship.<sup>14,15</sup> Ehrenberg emphasized that the number preterm labor was lower in pregnant women with the BMI over 25 compared to the pregnant women with a BMI under 25.<sup>16</sup> In our study we observed that the body height measurements of the pregnant women who had preterm labor were shorter compared to the control group (Table 3).

Arterial blood pressure levels of the pregnant women were measured. A significant relationship between the arterial blood pressure and preterm labor was found. High blood pressures of preeclamptic patients affected the mean arterial blood pressures in the case group.

In our study it was found that there was a significant relationship between smoking and preterm labor; there were a high number of active and passive smokers in the case group. In the literature relationship between smoking and SGA babies was generally emphasized. It was reported that the risk of preterm labor was the same for the pregnant women who never smoked and the pregnant women who quitted within the first 15 weeks.<sup>17</sup>

The high multiple pregnancy rate, ranges from 10 to 40% is still a major problem with IUI.<sup>18</sup> In any case for the multiple pregnancies time of birth was expected in earlier than usual natal weeks of pregnancy.<sup>19</sup> Thus the factor affecting the preterm labor might be the presence or absence of multiple pregnancies in artificial fertilization.

There have been a lot of studies on the vaginal infections during the pregnancy. A relationship was determined in most of the preterm labor studies. Donders et al found out that abnormal vaginal flora before the 14<sup>th</sup> week of pregnancy could result in preterm labor.<sup>20</sup> It was thought that especially decrease in the number of lactobacilli, bacterial vaginose, aerobic vaginitis, Mycoplasma hominis and candida colonization could result in preterm labor.<sup>20,21</sup> In our studies the relationship with preterm labor has been also demonstrated.

Some of the chronic diseases could result in preterm labor.<sup>22</sup> In our study the relationship between chronic diseases and preterm labor was also found significant. Hypertension, diabetes mellitus and goiter were the most frequently seen chronic diseases.

As a result, conditions related to low socio-cultural level,

advanced maternal age, high blood pressure, stressful situations, multiple pregnancies, artificial fertilizations, conditions of high leukocytosis, especially vaginal infections, presence of any chronic disease, deep anemia should cause us to suspect about the possibility of preterm labor; so that any of the risk factors should be eliminated by intensive monitoring in these pregnant women.

## Preterm Doğuma Neden Olan Risk Faktörleri

**AMAÇ:** Bu çalışmanın amacı gebede preterm doğuma neden olabilecek risk faktörlerinin belirlenmesidir.

**GEREÇ VE YÖNTEM:** Çalışma Bülent Ecevit Üniversitesi Tıp Fakültesi Kadın Hastalıkları ve Doğum servisinde yatan gebe hastalarda 1 Eylül 2008 - 1 Mayıs 2009 tarihleri arasında yapılmıştır. Çalışmada olası risk faktörlerini içeren bir form kullanıldı.

**BULGULAR:** Preterm doğum için yaş, sistolik kan basıncı, çoğul gebelik, kronik hastalıklar, kansızlık, cinsel ilişki, 1 ay içinde yaşanan üzücü olay, travma, düşük gelir düzeyi ve lökositöz Lojistik Regresyon Analizine göre anlamlı bulunan faktörlerdi.

**SONUÇ:** Düşük sosyoekonomik düzey, yüksek kan basıncı, stres, çoğul gebelik, tedavi gebelikleri, vajinal enfeksiyonlar, kronik hastalıklar ya da ağır anemi gibi durumlarda preterm doğum olabileceği düşünülmeli ve bu gebeler çok yakın takip edilerek tedavi edilmelidirler.

**Anahtar Kelimeler:** Preterm doğum, Risk faktörleri ve sosyo-kültürel şartlar

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