International Journal of Psychosocial Rehabilitation, Vol.24, Issue 01, 2020
ISSN: 1475-7192

# Risk factors associated with preterm labor in Al-Diwaniyah province: case control study

[1] Dr. Suaad Abdulzahra Mutar ,[2] Dr. Hayfaa Abdulhassan Raffas ,[3] Dr. Nabaa Abduljabbar Lateef

***Abstract***

*Background: Many preterm children will experience healthy life; however, a significant proportion of them will suffer long term disability because of serious complications during the perinatal period. On the other hand, families with preterm babies are going to suffer both psychologically and economically and the burden of preterm babies on national health budget is also significant. Therefore, prevention of preterm labor will reduce patient suffering and reduce cost of health budget allocated to obstetric practice.*

*Aim of the study: The current study was planned and conducted in the mid-Euphrates region of Iraq in order to identify the most frequent risk factors in association with preterm labor.*

*Patients and methods: The study included 30 women with preterm labor serving as a study group and 30 women with term labor serving as control group. A questionnaire form included age of mother, occupation, mode of delivery, residency, birth weight, history of antenatal care, estimation of body mass index (BMI), history of polyhydramnios, pregnancy induced hypertension, preeclampsia, essential hypertension, breech presentation, previous cesarean section, transverse lie, oligohydramnios, cervical incompetence, diabetes mellitus, short inter-pregnancy interval, previous history of preterm labor, uterine distortion, systemic lupus erythematosus (SLE), placental abruption, urinary tract infection (UTI), uterine fibroid and twin pregnancy.*

*Results: it was found that the frequencies of women less than 20 years and women more than > 35 years were significantly higher in preterm group in comparison with study group ($P < 0.001$). It was found that the frequencies of obese women and underweight women were significantly higher in preterm group in comparison with study group. The frequency of women with irregular antenatal care was higher in preterm group in comparison with term group, 63.3 % versus 26.7 %, respectively, in a highly significant manner ($P = 0.004$); the odds ratio (OR) was 4.75 with 95 % of 1.58 -14.25. Cervical incompetence, diabetes mellitus and short inter-pregnancy intervals were limited to women with preterm labor and represented significant risk factors for preterm labor ($P < 0.05$), with approximate OR of 16.18, 13.16 and 19.47.*

*Conclusion: relative extreme of reproductive age, abnormal body mass index, irregular antenatal care, diabetes mellitus, cervical incompetence and short inter-pregnancy intervals were the principal risk factors of preterm labor.*

**Key words:** *Risk factors, preterm labor, Al-Diwaniyah province, Iraq*

---

[1,2,3] Obstetrics and gynecology specialist/ Department of Obstetrics and gynecology / Al-Diwaniyah maternity and child teaching hospital.

## Introduction

If birth happens following completion of 20 weeks and before completion of 37 weeks, the condition will be termed preterm labor (Romero *et al*., 2014; Keelan and Newnham, 2017). The condition is still considered a major health issue worldwide despite long period of research work and adoption of measures that are believed to reduce incidence of preterm labor (Romero *et al*., 2014; Rubens *et al*., 2014). Preterm labor is a principal cause of mortality and morbidity during the perinatal period globally, in addition to be the most frequent cause of disability and mortality of children less than 5 years of age in developed countries (Chang *et al*., 2013; Harrison and Goldenberg, 2016).

Worldwide, it is estimated that 15 million preterm labors occur and approximately one million of them will end with child death (Keelan *et al*., 2017). Many preterm children will experience healthy life; however, a significant proportion of them will suffer long term disability because of serious complications during the perinatal period (Brown *et al*., 2014; Platt, 2014; Glass *et al*., 2015; Shah *et al*., 2016; Catov *et al*., 2017). On the other hand, families with preterm babies are going to suffer both psychologically and economically and the burden of preterm babies on national health budget is also significant (Platt, 2014; Romero *et al*., 2014; Strunk *et al*., 2014; Harrison and Goldenberg, 2016).

Spontaneous preterm labor is by far more frequent than iatrogenic one. The spontaneous cases may be associated with intact membrane or with pre-labor rupture of membrane (Romero *et al*., 2014; Rubens *et al*., 2014; Keelan and Newnham, 2017). A number of causes have been linked to preterm labor such as placental malperfusion, placental abruption and intrauterine inflammation or infection (Romero *et al*., 2014; Rubens *et al*., 2014; Stanek, 2014; Catov *et al*., 2017; Weiner *et al*., 2017). However, in most cases, inflammation appears the single most frequent denominator (Behnia *et al*., 2015; Nadeau-Vallée *et al*., 2016; Keelan, 2017). Placental malperfusion is an important cause of preterm labor in cases of singleton pregnancies and anti-coagulant therapy and aspirin are major therapeutic approaches (Allshouse *et al*., 2016; van Vliet *et al*., 2017). It appears that preventive strategies are more helpful than treating already existing cases of preterm labors; therefore, identification of risks associated with preterm labor provided good opportunity to prevent future cases (Newnham *et al*., 2014; Keelan and Newnham, 2017).

The current study was, therefore, planned and conducted in the mid-Euphrates region of Iraq in order to identify the most frequent risk factors in association with preterm labor. This is because identification of such factors may help reducing future incidence of such condition when health care strategies are directed toward treating or preventing such risk factors.

## Patients and methods

The current case control study was carried out in Al-Diwaniyah Maternity and Child Teaching Hospital starting from January the 3rd 2019 through January the 29th 2020. The study included 30 women with preterm labor serving as a study group and 30 women with term labor serving as control group. The selection of first preterm case was based on a random digit generated by computer software and the next 29 cases were selected as every other 2. On the other hand selection of the first term case was also based on a random digit generated by computer software, but the rest of control cases were selected on the basis of every other 10. A questionnaire form included age of mother, occupation, mode of delivery, residency, birth weight, history of antenatal care, estimation of body mass index (BMI), history of polyhydramnios, pregnancy induced hypertension, preeclampsia, essential hypertension, breech presentation, previous cesarean section, transverse lie, oligohydramnios, cervical incompetence, diabetes mellitus, short inter-pregnancy interval, previous history of preterm labor, uterine distortion, systemic lupus erythematosus (SLE), placental abruption, urinary tract infection (UTI), uterine fibroid and twin pregnancy.

Data were then transferred into an SPSS (statistical package for social sciences) (IBM, Chicago, USA, version 23) spreadsheet for purpose of statistical analysis. Quantitative variables were expressed as mean, standard deviation and range; whereas, qualitative data were expressed as number and percentage. Independent samples t-test was used to study the difference in means between study and control groups, Chi-square test was used to study difference in proportions between study and control groups and the risk was estimated using odds ratio. The level of significance was considered at $P \leq 0.05$.

The study was approved by the ethical approval committee of the college of medicine / University of Al-Qadisiyah. A verbal consent was obtained from every participant.

## Results

The demographic characteristics of women enrolled in the current study are shown in table 1. When mean age of women with preterm labor was compared to that of women with term pregnancy, there was no significant difference in the

mean, 27.50 ±10.03 years versus 28.53 ±5.91 years ($P = 0.629$); however, when women were categorized according to age, it was found that the frequencies of women less than 20 years and women more than > 35 years were significantly higher in preterm group in comparison with study group ($P < 0.001$), table 1. On the hand, there was no significant difference in mean age between preterm group and control group ($P = 0.931$), nevertheless, it was found that the frequencies of obese women and underweight women were significantly higher in preterm group in comparison with study group ($P = 0.019$), table 1.

There was also no significant difference in frequency distribution of women according to occupation and residency between preterm group and control group ($P > 0.05$), table 1. Highly significant difference was observed in mean birth weight between both groups ($P < 0.001$).

Other risk factors associated with preterm labor were presented in table 2. The frequency of women with irregular antenatal care was higher in preterm group in comparison with term group, 63.3 % versus 26.7 %, respectively, in a highly significant manner ($P = 0.004$); the odds ratio (OR) was 4.75 with 95 % of 1.58 -14.25, therefore, women with irregular antenatal care are at 4.75 risk of having preterm labor than women with regular antenatal care, table 2. Cervical incompetence, diabetes mellitus and short inter-pregnancy intervals were limited to women with preterm labor and represented significant risk factors for preterm labor ($P < 0.05$), with approximate OR of 16.18, 13.16 and 19.47, as shown in table 2. Other factors were not significantly associated with preterm labor including, mode of delivery, polyhydramnios, pregnancy induced hypertension, breech presentation, previous multiple CS, transverse lie, preeclampsia, oligohydramnios, previous history of preterm labor, uterine distortion, SLE, placental abruption, essential hypertension, urinary tract infection (UTI), fibroid and twin pregnancy.

**Table 1:** Demographic characteristics of women enrolled and birth weight of delivered babies

| **Characteristic** | **Control group** ***n*** **= 30** | **Study group** ***n*** **= 30** | ***P*** |
|---|---|---|---|
| **Age (years)** | | | |
| Mean ±SD | 28.53 ±5.91 | 27.50 ±10.03 | 0.629 † NS |
| Range | 19 -41 | 17 -43 | |
| < 20, *n* (%) | 1 (3.3 %) | 11 (36.7 %) | < 0.001 ¥ HS |
| 20-35, *n* (%) | 26 (86.7 %) | 10 (33.3 %) | |
| > 35, *n* (%) | 3 (10.0 %) | 9 (30.0 %) | |
| **BMI (kg/m$^2$)** | | | |
| Mean ±SD | 27.58 ±1.95 | 27.71 ±1.41 | 0.931 † NS |
| Range | 24.22 -32.05 | 17.36 -48.07 | |
| Underweight, *n* (%) | 1 (3.3 %) | 4 (13.3 %) | 0.019 ¥ S |
| Normal, *n* (%) | 3 (10.0 %) | 10 (33.3 %) | |
| Overweight and obese, *n* (%) | 26 (86.7 %) | 16 (53.3 %) | |
| **Occupation** | | | |
| Employee, *n* (%) | 10 (33.3 %) | 7 (23.3 %) | 0.390 ¥ NS |
| Housewife, *n* (%) | 20 (66.7 %) | 23 (76.7 %) | |
| **Residency** | | | |
| Urban, *n* (%) | 23 (76.7 %) | 17 (56.7 %) | 0.100 ¥ NS |
| Rural, *n* (%) | 7 (23.3 %) | 13 (43.3 %) | |
| **Birth weight** | | | |
| Mean ±SD | 3.22 ±0.29 | 1.83 ±0.29 | < 0.001 ¥ HS |
| Range | 2.8 -4 | 1.2 -2.3 | |

***n***: number of cases; **SD**: standard deviation; **BMI**: body mass index; †: Independent samples t-test; ¥: Chi-square test; **NS**: not significant at $P > 0.05$; **HS**: highly significant at $P \leq 0.01$; **S**: significant at $P \leq 0.05$

**Table 2:** Risk factors associated with preterm labor

| **Risk factor** | **Control group *n* = 30** | **Study group *n* = 30** | ***P*** | **OR** | **95 % CI** |
|---|---|---|---|---|---|
| Antenatal care | | | | | |
| Irregular, *n* (%) | 8 (26.7 %) | 19 (63.3 %) | 0.004 ¥ HS | 4.75 | 1.58 -14.25 |
| Regular, *n* (%) | 22 (73.3 %) | 11 (36.7 %) | | | |
| Cervical incompetence, *n* (%) | 0 (0.0 %) | 6 (20.0 %) | 0.024 F S | 16.18 | --- |
| Diabetes mellitus, *n* (%) | 0 (0.0 %) | 5 (16.7 %) | 0.052 F NS | 13.16 | --- |
| Short inter-pregnancy interval, *n* (%) | 0 (0.0 %) | 7 (23.3 %) | 0.011 F S | 19.47 | --- |

***n*:** number of cases; **OR**: odds ratio; **CI**: confidence interval; ¥: Chi-square test; **F**: Fischer exact test; **HS**: highly significant at $P \leq 0.01$; **S**: significant at $P \leq 0.05$

**Table 3:** Other possible risk factors

| **Characteristic** | **Control group *n* = 30** | **Study group *n* = 30** | ***P*** |
|---|---|---|---|
| Mode of delivery | | | |
| NVD, *n* (%) | 10 (33.3 %) | 17 (56.7 %) | 0.069 ¥ NS |
| CS, *n* (%) | 20 (66.7 %) | 13 (43.3 %) | |
| Polyhydramnios, *n* (%) | 9 (30.0 %) | 7 (23.3 %) | 0.559 ¥ NS |
| Pregnancy induced hypertension, *n* (%) | 1 (3.3 %) | 0 (0.0 %) | 1.000F NS |
| Breech, *n* (%) | 1 (3.3 %) | 0 (0.0 %) | 1.000F NS |
| Previous CS, *n* (%) | 4 (13.3 %) | 0 (0.0 %) | 0.112 F NS |
| Transverse lie, *n* (%) | 1 (3.3 %) | 0 (0.0 %) | 1.000 F NS |
| Preeclampsia, *n* (%) | 0 (0.0 %) | 4 (13.3 %) | 0.112 F |
| Oligohydramnios, *n* (%) | 0 (0.0 %) | 1 (3.3 %) | 1.000 F NS |
| Previous history of PL, *n* (%) | 0 (0.0 %) | 2 (6.7 %) | 0.492 F NS |
| Uterine distortion, *n* (%) | 0 (0.0 %) | 1 (3.3 %) | 1.000 F NS |
| SLE, *n* (%) | 0 (0.0 %) | 1 (3.3 %) | 1.000 F NS |
| Abruption, *n* (%) | 0 (0.0 %) | 3 (10.0 %) | 0.237 F NS |
| Essential hypertension, *n* (%) | 0 (0.0 %) | 1 (3.3 %) | 1.000 F NS |
| UTI, *n* (%) | 0 (0.0 %) | 3 (10.0 %) | 0.237 F |

| | | | |
|---|---|---|---|
| | | | NS |
| Fibroid, *n* (%) | 0 (0.0 %) | 2 (6.7 %) | 0.492 F NS |
| Twin, *n* (%) | 0 (0.0 %) | 1 (3.3 %) | 1.000 F NS |

***n*:** number of cases; **NVD**: normal vaginal delivery; **CS:** cesarean section; **PL**: preterm labor; **SLE**: systemic lupus erythematosus; **UTI**: urinary tract infection; ¥: Chi-square test; **F**: Fischer exact test; **NS**: not significant at $P > 0.05$

**Discussion**

In order to prevent preterm labor successfully, an approach that is multifaceted should be adopted. Such approach should combine modification of life style, improvement of antenatal care, efficient diagnostic techniques, educational programs and fruitful medical interventions (Newnham *et al*., 2017). Women who want to get pregnant should be advised to do weight reduction, to quit smoking and to take creation micronutrient as these measures greatly reduce the incidence of preterm birth (Frayne *et al*., 2017; Lengyel *et al*., 2017; Toivonen *et al*., 2017), however, access and implementation remain limiting factors (Lengyel *et al*., 2017; Poels *et al*., 2017; Toivonen *et al*., 2017).

In the current study, relative extremes of reproductive age, < 20 and > 35, were shown to be significantly associated with preterm labor. Advanced maternal age has been shown to be significantly associated with preterm labor by several authors (McIntyre *et al*., 2009; Lawlor *et al*., 2011; Klemetti *et al*., 2016; Fuchs *et al*., 2018). These findings support the current study findings. It has been suggested that advanced maternal age may be associated with significantly higher rates of obstetric complications such preeclampsia or increased rate of medical conditions such as essential hypertension and diabetes mellitus; however, it has been shown by several authors that advanced maternal is an independent predictor of preterm labor (McIntyre *et al*., 2009; Fuchs *et al*., 2018).

On the other hand, the correlation between preterm birth and young maternal age is still controversial issue. In a number of researches the correlation vanishes after controlling for reproductive factors and socio-demographic confounders, therefore, it has been that sociodemographic factors rather than biological roles are the main blamed reasons behind preterm labor in young ladies. Nevertheless, in other researches the correlation remained significant following adjustment for confounders (da Silva *et al*., 2003).

In addition, in the current study, abnormal BMI, whether high or low, was associated with preterm labor significantly. The contribution of maternal body mass index to the outcome of preterm labors and how it interacts with other sociodemographic and biological determinants are still controversial. It has been shown that both higher than normal BMI and lower than normal BMI are associated with increased risk of preterm labor (Vinturache *et al*., 2017).

Lack of regular antenatal care was associated with approximately 5 times risk of having preterm labor in the current study. The association between regular antenatal care and prevention of preterm labor has been shown by other authors (Beeckman *et al*., 2012; Piso *et al*., 2014), supporting the findings of the current study. Cervical incompetence, short inter-pregnancy and diabetes mellitus interval were all associated significantly with preterm labor in the current study. Similar results have been described by previous studies (Satterfield *et al*., 2016; Govindappagari *et al*., 2017; Saral and Ulas, 2019).

In conclusion, relative extreme of reproductive age, abnormal body mass index, irregular antenatal care, diabetes mellitus, cervical incompetence and short inter-pregnancy intervals were the principal risk factors of preterm labor.

**References**

Allshouse AA, Jessel RH, Heyborne KD: The impact of low-dose aspirin on preterm birth: secondary analysis of a randomized controlled trial. *J Perinatol.* 2016;36(6):427–31.

Beck S, Wojdyla D, Say L, et al. : The worldwide incidence of preterm birth: a systematic review of maternal mortality and morbidity. *Bull World Health Organ.* 2010;88(1):31–8.

Beeckman K, Louckx F, Downe S, Putman K. The relationship between antenatal care and preterm birth: the importance of content of care. The European Journal of Public Health. 2012;23:366–371.

Behnia F, Taylor BD, Woodson M, et al. : Chorioamniotic membrane senescence: a signal for parturition? *Am J Obstet Gynecol.* 2015;213(3):359.e1–16. 10.

Brown HK, Speechley KN, Macnab J, et al. : Neonatal morbidity associated with late preterm and early term birth: the roles of gestational age and biological determinants of preterm birth. *Int J Epidemiol.* 2014;43(3):802–14.

Catov JM, Scifres CM, Caritis SN, et al. : Neonatal outcomes following preterm birth classified according to placental features. *Am J Obstet Gynecol.* 2017;216(4):411.e1–411.e14.

Chang HH, Larson J, Blencowe H, et al. : Preventing preterm births: analysis of trends and potential reductions with interventions in 39 countries with very high human development index. *Lancet.* 2013;381(9862):223–34.

da Silva AA, Simões VM, Barbieri MA, Bettiol H, et al. Young maternal age and preterm birth. Paediatr Perinat Epidemiol. 2003;17:332–39.

Frayne J, Hauck Y: Enjoying a healthy pregnancy: GPs' essential role in health promotion. *Aust Fam Physician.* 2017;46(1):20–5.

Fuchs F, Monet B, Ducruet T, Chaillet N, Audibert F. Effect of maternal age on the risk of preterm birth: A large cohort study. *PLoS One*. 2018;13(1):e0191002.

Glass HC, Costarino AT, Stayer SA, et al. : Outcomes for extremely premature infants. *Anesth Analg.* 2015;120(6):1337–51.

Govindappagari S, Zork N, Merriam A, Gyamfi-Bannerman C. Is the Relationship between Short Interpregnancy Interval and Preterm Birth Related to a Short Cervix? Am J Perinatol. 2017 Jul;34(9):922-926.
Harrison MS, Goldenberg RL: Global burden of prematurity. *Semin Fetal Neonatal Med.* 2016;21(2):74–9.

Keelan JA, Newnham JP. Recent advances in the prevention of preterm birth. *F1000Res*. 2017;6:F1000 Faculty Rev-1139.

Keelan JA: Intrauterine inflammatory activation, functional progesterone withdrawal, and the timing of term and preterm birth. *Journal of Reproductive Immunology.* 2017.

Klemetti R, Gissler M, Sainio S, Hemminki E. At what age does the risk for adverse maternal and infant outcomes increase? Nationwide register-based study on first births in Finland in 2005–2014. Acta Obstet Gynecol Scand. 2016;95(12):1368–75.

Lawlor DA, Mortensen L, Andersen AM. Mechanisms underlying the associations of maternal age with adverse perinatal outcomes: a sibling study of 264 695 Danish women and their firstborn offspring. International journal of epidemiology. 2011;40(5):1205–14.

Lengyel CS, Ehrlich S, Iams JD, et al. : Effect of Modifiable Risk Factors on Preterm Birth: A Population Based-Cohort. *Matern Child Health J.* 2017;21(4):777–85.

McIntyre SH, Newburn-Cook CV, O'Brien B, Demianczuk NN. Effect of older maternal age on the risk of spontaneous preterm labor: a population-based study. Health care for women international. 2009;30(8):670–89.

Nadeau-Vallée M, Obari D, Palacios J, et al. : Sterile inflammation and pregnancy complications: a review. *Reproduction.* 2016;152(6):R277–R292.

Newnham JP, Dickinson JE, Hart RJ, et al. : Strategies to prevent preterm birth. *Front Immunol.* 2014;5:584.

Newnham JP, Kemp MW, White SW, et al. : Applying Precision Public Health to Prevent Preterm Birth. *Front Public Health.* 2017;5:66.

Piso B, Zechmeister-Koss I, Winkler R. Antenatal interventions to reduce preterm birth: an overview of Cochrane Systematic Reviews. *BMC Res Notes*. 2014;7:265.

Platt MJ: Outcomes in preterm infants. *Public Health.* 2014;128(5):399–403.

Poels M, Koster MP, Boeije HR, et al. : Why Do Women Not Use Preconception Care? A Systematic Review On Barriers And Facilitators. *Obstet Gynecol Surv.* 2016;71(10):603–12.

Romero R, Dey SK, Fisher SJ: Preterm labor: one syndrome, many causes. *Science.* 2014;345(6198):760–5.

Rubens CE, Sadovsky Y, Muglia L, et al. : Prevention of preterm birth: harnessing science to address the global epidemic. *Sci Transl Med.* 2014;6(262):262sr5.

Saral N, Ulas SC. The effect of short pregnancy interval on perinatal outcomes in Turkey: A retrospective study. *Pak J Med Sci*. 2019;35(5):1243–1247.

Satterfield N, Newton ER, May LE. Activity in Pregnancy for Patients with a History of Preterm Birth. *Clin Med Insights Womens Health*. 2016;9(Suppl 1):17–21.

Shah PS, Lui K, Sjörs G, et al. : Neonatal Outcomes of Very Low Birth Weight and Very Preterm Neonates: An International Comparison. *J Pediatr.* 2016;177:144–152.

Stanek J: Comparison of placental pathology in preterm, late-preterm, near-term, and term births. *Am J Obstet Gynecol.* 2014;210(3):234.e1–6.

Strunk T, Inder T, Wang X, et al. : Infection-induced inflammation and cerebral injury in preterm infants. *Lancet Infect Dis.* 2014;14(8):751–62.

Toivonen KI, Oinonen KA, Duchene KM: Preconception health behaviours: A scoping review. *Prev Med.* 2017;96:1–15.

van Vliet EO, Askie LA, Mol BW, et al. : Antiplatelet Agents and the Prevention of Spontaneous Preterm Birth: A Systematic Review and Meta-analysis. *Obstet Gynecol.* 2017;129(2):327–36.

Vinturache A, McKeating A, Daly N, Sheehan S, Turner M. Maternal body mass index and the prevalence of spontaneous and elective preterm deliveries in an Irish obstetric population: a retrospective cohort study. *BMJ Open*. 2017;7(10):e015258.

Weiner E, Dekalo A, Feldstein O, et al. : The placental factor in spontaneous preterm birth in twin vs. singleton pregnancies. *Eur J Obstet Gynecol Reprod Biol.* 2017;214:1–5.