

Relation between time to pregnancy and pregnancy outcome

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Abstract

Background: Studies have shown significant correlation between time to pregnancy (TTP) and pregnancy outcomes. But understanding of these mechanisms may not be facilitated. The aim of this study was to determine the relation between TTP and pregnancy outcome.

Materials and Methods: This study was a case cohort study that was done in Shahid Beheshti Educational Hospital during 2006-2007. Women aged 18-35 years, who had only one pregnancy without using any contraception method before pregnancy and delivered their first child, were enrolled in this study. Thus, 801 women were selected and followed up for pregnancy outcome and TTP until the end of pregnancy. All the participants filled in a special questionnaire. Finally the collected data were entered into computer and analyzed by SPSS ver. 20 software.

Results: The frequency distribution of TTP-based pregnancy outcome showed that TTP >48 weeks was higher in normal delivery than in abnormal delivery (5.6% vs. 19.4%). According to Chi-square test, the frequency distribution of pregnancy outcome was related to TTP ($P < 0.001$).

Conclusion: According to the results of this study, there is a significant relationship between TTP and pregnancy outcome, and TTP may lead to unwanted complications such as ectopic pregnancy, preterm labor, and abortion. Thus, all women with a long time of contraception, especially in the rural areas, must be controlled.

Key words: Contraception, pregnancy outcome, time to pregnancy

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INTRODUCTION

Time to pregnancy (TTP) is defined as the time which is needed for achieving a wanted pregnancy. TTP can be used to estimate fecundability^[1] and has been found to be a useful tool for the assessment

of reproductive effects.^[2] TTP is affected by several biologic, psychologic, and environmental factors.^[1] However, as easy as TTP is to inquire about, it is difficult to explain the complex mechanisms of biologic, sociologic, and environmental factors that may affect TTP.

Births with known TTP during the period of 1989-2007 were analyzed to investigate the relation between TTP and pregnancy outcome among 17,114 couples who conceived spontaneously. The adjusted odds ratio (aOR) [95% confidence interval (CI)] for poor neonatal health, including low Apgar score, low umbilical vein pH, and the need for neonatal intensive care, was 1.51 (1.09-2.09) in women with a TTP of

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25-36 months and 1.60 (1.18-2.19) in women who had a TTP of >or 37 months, compared to women with a TTP of 0-6 months.^[3]

Studies have shown significant correlation between TTP and pregnancy outcomes.^[3] But understanding of these mechanisms may not be facilitated.^[4] Also, some factors seem to have an effect on TTP. For example, lifestyle factors and occupational and environmental factors have been suggested to affect the female reproductive system.^[5] Although information on several factors is available, it explains only a small fraction of the variation in the observed TTPs. Furthermore, female biological factors seem to be more important predictors of TTP than the lifestyle factors.

Pregnancy has several adverse outcomes like preterm labor, threatened abortion, cerebral palsy, low birth weight, ectopic pregnancy (EP), and multiple pregnancy.^[4] Also, TTP can cause some of couple difficulties in our country. In other words, elongation of TTP may be led to idea of infertility. Results of various studies have shown that longer TTP correlates with preterm labor, abortion, and EP.^[6] Significant relationship has also been reported between twin pregnancy and lower TTP.^[4]

Also, some studies have shown that TTP has a positive effect on pregnancies ending in miscarriage compared to pregnancies ending with the birth of a live child. Prolonged TTPs were also found for extrauterine pregnancies, whereas TTP for pregnancies ending in multiple birth was shorter than that for pregnancies ending in singleton live birth. Among women with pregnancies ending in singleton birth, a long TTP was a risk factor for preterm delivery.^[6]

As adverse outcomes of pregnancy are heavy burdens for the families and society, especially in developing countries like Iran, we designed this study for assessing the correlation between TTP and pregnancy outcomes.

MATERIALS AND METHODS

This study was a case cohort study that was done in Shahid Beheshti Educational Hospital during 2006-2007. Women aged 18-35 years, who had only one pregnancy without using any contraception method before pregnancy and delivered their first child, were enrolled in this study. Women with previous history of pelvic inflammatory disease (PID), *in vitro* fertilization (IVF), and more than one pregnancy were excluded.

In this study, 1000 women who met the inclusion criteria were selected and followed up for pregnancy

outcome and TTP until the end of pregnancy. During the study, 199 women were excluded, and finally, 801 women remained in the study. Pregnancy outcomes were divided into four subgroups which included abortion, EP, preterm labor, and normal. Also, TTP was divided into four groups which included less than 12 weeks, between 12 and 24 weeks, between 25 and 48 weeks, and more than 48 weeks.

All the participants filled in a special questionnaire that included demographic characteristics, TTP, pregnancy outcomes, mother's age at the time of first pregnancy, neonate's gender, and birth weight of the neonate. Finally, the collected data were entered into computer and analyzed by SPSS ver. 20 software. The Chi-square test was used for comparison of qualitative data and one-way analysis of variance (ANOVA) test for comparison of quantitative data between more than two groups.

RESULTS

Eight hundred and one women who met the inclusion criteria were followed up; among them, 534 (66.7%) had normal delivery and 267 cases had abnormal delivery outcome which included 60 (7.5%) abortion, 40 (5%) EP, and 167 (20.8%) preterm labor. The frequency distribution of pregnancy outcome is shown in Figure 1. Also, the frequency distribution of TTP is shown in Figure 2. TTP was less than 12 weeks in 410 (51.2%) women, 12-24 weeks in 102 (12.7%) women, 25-28 weeks in 134 (16.7%) women, and > 48 weeks in 155 (19.4%) women.

The frequency distribution of TTP based on pregnancy outcome is shown in Table 1. Based on the results of this table, TTP >48 weeks was higher in normal delivery than in abnormal delivery (5.6% vs. 19.4%) and according to Chi-square test, the frequency

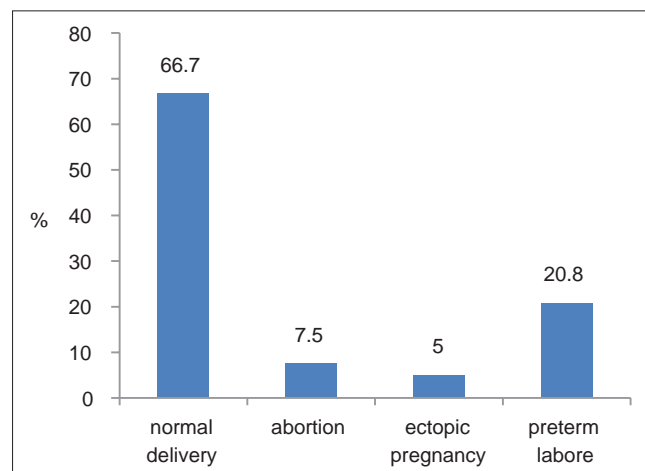


Figure 1: Frequency distribution of pregnancy outcome

distribution of pregnancy outcome was related to TTP ($P < 0.001$).

According to the results of this study, most of the participants with TTP <12 weeks (67.2%) belonged to the control group (normal pregnancy) and the least number of participants with TTP <12 weeks (17.5%) were in EP and preterm subgroups.

Majority of the participants with TTP between 12 and 24 weeks (15.2%) were in control group and the least number of participants with TTP between 12 and 24 weeks (1.7%) were in abortion subgroup.

In our study, most of the subjects with TTP between 24 and 48 weeks (32.5%) were seen in EP subgroup and the least (12%) number of subjects was in control group.

Majority of the participants with TTP >48 weeks (49.1%) belonged to preterm labor subgroup and the least number of participants with TTP >48 weeks (5.6%) was in control group.

The Mean \pm SD TTP values in cases and controls are shown in Table 2. According to one-way ANOVA test, the mean TTP was statistically significant in the four groups ($P < 0.001$). Also, according to least significant difference (LSD) *post-hoc* test, the mean of TTP between controls and the other three groups was statistically significant, but no statistically significant difference was observed between abortion, EP, and preterm groups ($P > 0.05$).

According to the results of this study, 60 patients (7.8%) had PIH and 75 (10.5%) had gestational diabetes mellitus (GDM). Table 3 shows the frequency distribution of pregnancy-induced hypertension (PIH), and GDM based on TTP. Applying Chi-square test, it is observed that the frequency distribution of PIH and GDM was statistically significant between the four groups of TTP ($P < 0.001$).

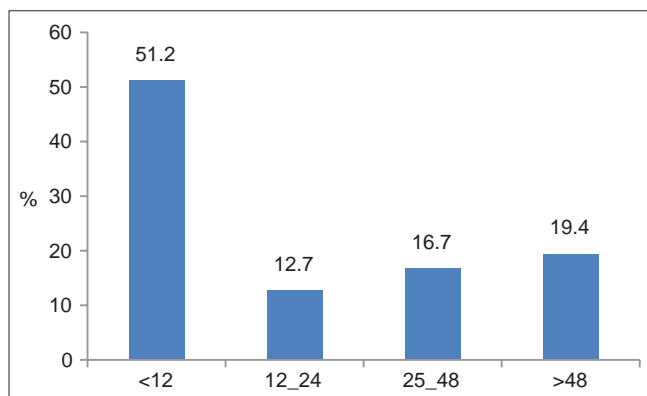


Figure 2: Frequency distribution of TTP

DISCUSSION

The aim of this study was understand the relation between TTP and pregnancy outcome. Results of the current study showed a significant relation between TTP and pregnancy outcome. Previous studies have also shown such a relationship between TTP and outcomes of pregnancy.^[3] In a study it was shown that specific risk factors for pregnancy beyond 41 weeks of gestation include obesity (aOR, 1.26; 95% CI, 1.16-1.37), nulliparity (aOR, 1.46; 95% CI, 1.42-1.51), and maternal age 30-39 years (aOR, 1.06; 95% CI, 1.02-1.10) and 40 years or older (aOR, 1.07; 95% CI, 1.02-1.12). In addition, African American, Latina, and Asian race/ethnicity were all associated with a lower risk of reaching 41 or 42 weeks of gestation.^[7] This study revealed that the race can be an effective factor in this matter. Our finding was similar to the results of Henriksen *et al.* and Axmon *et al.*'s studies which showed significant correlation between longer TTP and preterm labor.^[6] Axmon *et al.*, in several other studies, reported that women with term pregnancy have shorter TTP compared to women with preterm labor.

It has been reported in several other studies that women with term pregnancy have shorter TTP

Table 1: Frequency distribution of TTP based on delivery outcome

| Outcome TTP, weeks | Normal | | Abnormal | | Total | |
|--------------------|--------|------|----------|------|-------|------|
| | n | % | n | % | n | % |
| <12 | 359 | 67.2 | 46 | 17.1 | 405 | 50.6 |
| 12-24 | 81 | 15.2 | 4 | 1.6 | 85 | 10.6 |
| 25-48 | 64 | 45 | 86 | 32.2 | 150 | 18.7 |
| >48 | 30 | 5.6 | 131 | 49.1 | 161 | 20.1 |
| Total | 534 | 100 | 267 | 100 | 801 | 100 |

$P < 0.001$. TTP: Time to pregnancy

Table 2: Mean \pm SD of time to pregnancy in the studied groups

| Groups | n | Mean | Standard deviation |
|----------|-----|-------|--------------------|
| Control | 534 | 20.95 | 5.21 |
| Abortion | 60 | 90.13 | 10.6 |
| EP | 40 | 87.55 | 9.7 |
| Preterm | 167 | 99.54 | 13.4 |

SD: Standard deviation, EP: Ectopic pregnancy

Table 3: Frequency distribution of PIH and GDM based on TTP

| TTP, weeks | PIH | | GDM | |
|------------|-----------|-------------|------------|-------------|
| | Yes | No | Yes | No |
| <12 | 17 (4.2%) | 388 (95.8%) | 20 (5.2%) | 368 (94.8%) |
| 12-24 | 9 (10.6%) | 76 (89.4%) | 15 (19.7%) | 61 (80%) |
| 25-48 | 13 (8.7%) | 137 (91.3%) | 20 (14.6%) | 117 (85.4%) |
| >48 | 21 (16%) | 110 (84%) | 20 (18.2%) | 90 (81.8%) |
| P value | <0.001 | | <0.001 | |

TTP: Time to pregnancy, GDM: Gestational diabetes mellitus, PIH: Pregnancy-induced hypertension

compared to women with preterm labor. They have also reported that an increased TTP (i.e. decreased fecundability) was associated with pregnancies ending in miscarriage (early as well as late) and extrauterine pregnancies. Pregnancies ending in multiple live births tended to have shorter TTPs than those ending in single live births. No association was found between TTP and stillbirths. Among women whose pregnancies ended in singleton births, a prolonged TTP was associated with preterm delivery.^[5,8-12]

Axmon *et al.* also reported a significant relationship between longer TTP, and EP and abortion.^[7] Our results are similar to those of Henriksen *et al.*^[8] Henriksen *et al.* also reported the correlation between shorter TTP and increase in the prevalence of multiple pregnancy,^[9] but we did not have any case with multiple pregnancy in the current study.

According to the results of a study, human gestational length varies considerably even when measured exactly (from ovulation). An individual woman's deliveries tend to occur at similar gestational ages. Events in the first 2 weeks after conception are predictive of subsequent pregnancy length, and may suggest pathways underlying the timing of delivery.^[12]

In a study on African population, the median TTP was 6 months, with 68% of women achieving pregnancy in the first year. About 10% of all pregnancies recorded resulted in spontaneous abortion, which can be due to the different race and it needed more comparative studies to approve.^[13]

The TTP distribution showed that majority of women achieved pregnancy in the first 3 months, with a gradual tailing off of the distribution to the right. Since TTP distribution has not been previously studied in Iran, there are no studies on the Iranian population to compare this distribution.

According to the results of this study, there is a significant relation between TTP and pregnancy outcome, and TTP may lead to unwanted complications such as EP, preterm labor, and abortion.^[10] Thus, all women with a long time of contraception, especially in the rural areas, must be controlled.

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