

*Original Article***Assessment of correlation between unprotected coitus and preeclampsia**

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**Abstract**

**BACKGROUND:** Preeclampsia is a common complication of pregnancy often leading to significant maternal and fetal complications. Preeclampsia occurs more frequently in primigravidae and in multigravidae who have a change in paternity. Length of sperm exposure has been proposed to influence the risk of preeclampsia. The aim of this study was to assess the relationship between unprotected coitus and preeclampsia.

**METHODS:** A case-control design was used to compare 91 women with preeclampsia (cases) with 91 matched ones in control group. The age range was from 20 to 35 years. Subjects were selected from mothers referred to Mahdieh and Akbar-Abadi hospitals. Data were gathered by interview method and were analyzed by independent t-test, Mann-Whitney, chi-square, and logistic regression using SPSS software.

**RESULTS:** Women with a short period of co-habitation (<4 months) or the ones who used barrier methods for contraception had a substantially higher risk for development of preeclampsia compared with women with more than 4 months of cohabitation before conception ( $P = 0.0001$ ). Oral contraceptive users had a lower preeclampsia rate than women who used no oral contraceptive ( $P = 0.003$ ). No relationship was observed between coital rate before and during pregnancy and the risk of preeclampsia.

**CONCLUSIONS:** This study suggests that the risk of developing preeclampsia in primigravidae is inversely proportional to the duration of sexual co-habitation.

**KEY WORDS:** Preeclampsia, unprotected coitus, sperm exposure, barrier contraceptive.

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**P**re-eclampsia is a multisystem disorder of unknown etiology, unique to pregnancy. Women with pre-eclampsia usually develop raised blood pressure and proteinuria, but the condition is also associated with abnormalities of the coagulation system, disturbed liver function, renal failure and cerebral ischemia<sup>1</sup>. It complicates an estimated 2-8% of pregnancies and is a major cause of maternal morbidity, perinatal death and premature delivery<sup>2</sup>. Preeclampsia is the second leading cause of maternal mortality in the

world. Mortality of neonates will be five times more when mother has preeclampsia<sup>3,4</sup>. Preeclampsia causes 15% of preterm labors and the incidence of this disease reported in 6% of all pregnant women<sup>3</sup>. The most common fetal complications of severe preeclampsia are intrauterine growth retardation, severe hypoxia and still birth because of early placental abruption and preterm labor<sup>5</sup>. Eclampsia, the occurrence of one or more convulsions superimposed on the syndrome of pre-eclampsia, occurs less frequently, complicating between 1 in

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100-1700 pregnancies in the developing world and about 1 in 2000 pregnancies in Europe and other developed countries<sup>6</sup>. Eclampsia is often a serious and life-threatening condition. Compared to pre-eclampsia, and carries a much higher risk of death and serious morbidity for the woman and her baby. In the UK, for example, 1 in 50 of the women who have eclampsia dies. Over half a million women die each year of pregnancy-related causes, and 99% of these deaths occur in the developing world<sup>7</sup>. Eclampsia probably accounts for 50,000 maternal deaths a year<sup>8</sup>. Preeclampsia is a complication of 25-30% of nulliparous pregnancies. As preeclampsia in nulliparous women is more common than in multiparous women, the first pregnancy is a risk factor for preeclampsia<sup>9</sup>.

More over, prevalence of preeclampsia in multiparous women is less than that in nulliparous ones but, in the second marriage the risk is equal between two groups because the new mate would expose her to new antigens<sup>10</sup>. Fetoplacental antigens will be neutralized by protective maternal antibodies on the basis of an immunologic phenomenon. Mother had to be exposed to mate antigens of semen to provide these antibodies<sup>11</sup>. Pathogenesis of preeclampsia made the concept that this phenomenon happens in those who become pregnant in the first intercourse after their marriage, because they confront the placental invasion that is an incompatible tissue between mother and fetus which leads to immune response against placental antigens<sup>12</sup>. In fact, women who use barrier contraceptive methods and make a chemo-mechanical barrier between cervix and sperms may be at higher risk of preeclampsia later<sup>13</sup>. Einarsson in one study showed that preeclampsia was more common in those who had sperm exposure duration less than four months before pregnancy<sup>10</sup>. Morcos also explained that preeclamptic incidence in multiparous women can be increased by prolonged duration of sperm exposure be-

fore pregnancy<sup>14</sup>. Because of high frequency of preeclampsia in our country and lack of study about the relationship between preeclampsia and unprotected coitus, this study was performed to determine the risk of preeclampsia in unprotected coitus.

## Methods

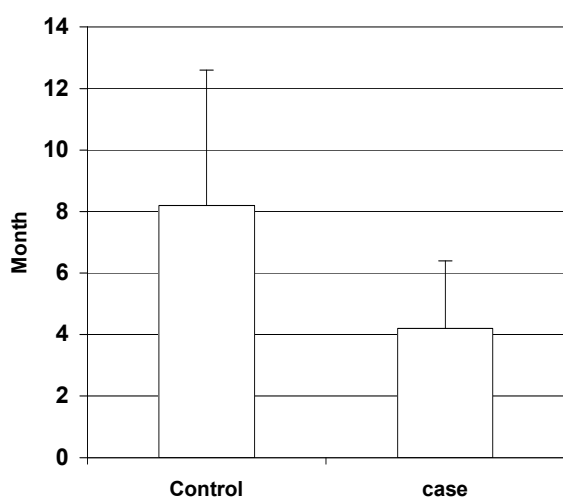
This was an analytical case-control study and our main variables were unprotected coitus and preeclampsia. The subject population consisted of all nulliparous pregnant women between 20 and 35 years old, who delivered at Mahdieh and Akbar-Abady Hospitals, Tehran in summer and fall 2004. Our sample size estimation was based on statistical calculation ( $\alpha = 0.05$ , power of 80%, prevalence of cohabitation <4 months estimated at 4%, an odds ratio of 2.5 using a 1.2 ratio between case and controls). We needed 45 cases and 45 controls. We enrolled 91 cases and 91 controls for more confidence. These two groups were matched and had similarity in variables. All women were interviewed about the duration of sexual cohabitant prior to conception and the incidence of preeclampsia.

The diagnosis of preeclampsia was made in accordance with the criteria of the American College of Obstetrician and Gynecologists<sup>1</sup>. Exclusion criteria were age below 20 or above 35 years, pregnancy, foreign nationality, multiparty, history, of abortion, twins and hydatiform mole or other diseases<sup>1</sup>. Also, subjects with history of blood transfusion, women who were apart from their husbands before or during pregnancy for any reason, and those who were pregnant in their second marriage were excluded. Cases of preterm labor were also excluded from the control group. We used special questionnaires and our interviews were performed immediately before and after delivery. The study population was ethnically uniform. We controlled for recognized risk factors of preeclampsia in our analysis and evaluated the sperm exposure time before pregnancy by asking the coitus frequency in the last week before pregnancy and also in the first 20 weeks

of pregnancy. Data were analyzed with SPSS using student's t-test, chi square, Mann-Whitney, two-way analysis of variance, and logistic regression tests.

## Results

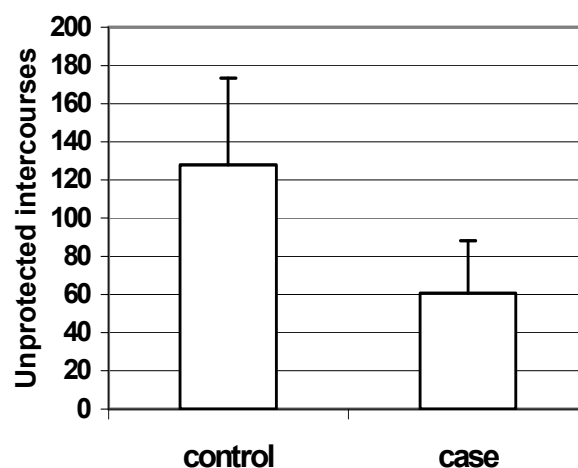
Mean duration of sperm exposure before pregnancy was  $4.2 \pm 6.4$  months in the preeclamptic group and  $8.2 \pm 12.6$  months in the non-preeclamptic group, showing a significant difference between the case and control groups ( $P = 0.0001$ ) (figure 1).



**Figure 1.** The sperm exposure duration in preeclamptic group and control group.

Average unprotected coitus per week during the first 20 weeks of gestation did not statistically differ between the two groups ( $P = 0.8$ ). Frequency of total unprotected intercourse was  $60.6 \pm 88.2$  in the preeclamptic group and  $127.9 \pm 173.5$  in the non-preeclamptic group (figure 2). There was no significant difference between the two groups in respect of the correlation of frequency of intercourse without protection ( $P = 0.48$ ), but the total number of unprotected coituses before pregnancy were different in the case and control groups. Duration of oral contraceptive pill usage before pregnancy was significantly different in the two groups ( $P = 0.003$ ) and was longer in the patients without preeclampsia. The ratio of length of marriage to the interval between two pregnancies was  $10.2 \pm 13.6$  in

preeclamptic cases and  $13.9 \pm 15.9$  in controls which was significantly different in the two groups ( $P = 0.008$ ). The prevalence of unexpected pregnancies was also different in the case and control groups ( $P = 0.03$ ) and unplanned pregnancies were more common in preeclamptic cases ( $P = 0.03$ ).



**Figure 2.** Total unprotected intercourse in preeclampsia group and control group.

## Discussion

In this study mean sperm exposure duration in control group was almost two times longer than preeclamptic cases. Incidence rate of preeclampsia in women who had cohabitations more than 4 months before pregnancy was significantly less than that in those with sperm exposures less than 4 months. Mean sperm exposure time in Einarsson study was significantly different in case and control groups and preeclampsia was more common in those who had sperm exposure duration less than 4 months before pregnancy<sup>10</sup>. Gratacos and Morcos have also explained this relationship<sup>14,15</sup>. In our study, ratio of length of marriage to the interval between two pregnancies was significantly different in case and control groups and there was a positive correlation between this ratio and sperm exposure duration. It means that by increasing the ratio of length of marriage to the interval between two pregnancies without using barrier contraceptives, longer sperm exposure duration will occur and the probability of preeclampsia will decrease

<sup>16</sup>. Using oral contraceptive pills before pregnancy was significantly more common in the control group in our study which brings longer sperm exposure period and less preeclampsia incidence.

Marti and Herrmann reported that mean time of using oral contraceptive pills before pregnancy in control group was 3 times more than that in those with preeclampsia (case group) <sup>17</sup> but Gratacos showed no difference of that between two groups <sup>15</sup>. Our results suggested a relationship between sperm exposure and risk for preeclampsia and even a short period of exposure to sperm seemed to offer protection against development of preeclampsia. Specifically, only women with limited exposure (primigravidae using barrier methods in a period of <4 months) seemed to be at elevated risk for development of preeclampsia. Exposure to seminal fluids before conception could result in down-regulation of the mother's immune response to foreign antigens, thereby reducing the risk for development of preeclampsia <sup>18,19</sup>.

Compared with previous studies, we had a large number of study participants <sup>3,4</sup>. However, sexual practices might not be accurately reported. Because of time constraints, we did not include questions regarding use of other methods of contraception. Finally, the majority had a prolonged period of cohabitation before conception. The results indicated that unprotected pregnancy prevalence was different in

two groups meaningfully and was more common in those who had preeclampsia. This fact showed that preeclampsia was more common in those women who became pregnant shortly after marriage and didn't use contraception or the contraceptive method failed which can explain shorter sperm exposure in these cases. In final, a relatively short period of exposure to sperm seems to offer protection against development of preeclampsia. If these results are confirmed, primigravid women who use barrier methods in consistent manner may need to be advised to prolong sexual cohabitation before conception without using barrier methods in an effort to decrease the risk of preeclampsia.

### Conclusions

As preeclampsia is one of medicine dilemmas, we hope the results of this research in gynecology and obstetrics medicine help us prevent preeclampsia, so we recommend young women who plan to be pregnant, to have a period of using non barrier contraceptives for at least 4 months before pregnancy.

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