

## Effect of socio-cultural factors on spontaneous abortion in Burdur, Turkey: A population based case-control study

Binali Catak<sup>1</sup>, Can Oner<sup>2</sup>,  
Sevinc Sutlu<sup>3</sup>, Selcuk Kilinc<sup>4</sup>

### ABSTRACT

**Objective:** To determine the sociocultural factors that have effect on spontaneous abortion in Burdur, Turkey.

**Methods:** Study was designed as case-control study. The case group consist of 257 women whose pregnancies ended with spontaneous abortion. The control group consisted of 514 women whose pregnancy continued since 22 weeks and more during the study. Chi-square, and backward LR logistic regression were utilized in analyses.

**Results:** In multifactorial-analyses it was determined that four factors (educational status of women, employment status of women, exposure to physical violence and non-receipt of ANC) created independent risk on spontaneous abortions.

**Conclusions:** Pregnant women with these risk factors should be followed up more frequently and in a more qualified way in primary and secondary and tertiary health institutions.

**KEY WORDS:** Abortion, Factors, Case Control Studies, Miscarriage, Socioeconomic, Spontaneous Abortion.

doi: <http://dx.doi.org/10.12669/pjms.325.10078>

### How to cite this:

Catak B, Oner C, Sutlu S, Kilinc S. Effect of socio-cultural factors on spontaneous abortion in Burdur, Turkey: A population based case-control study. *Pak J Med Sci.* 2016;32(5):1257-1262. doi: <http://dx.doi.org/10.12669/pjms.325.10078>

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

1. Binali Catak, MD.  
Assistant Professor,  
Department of Public Health,  
Kafkas University, School of Medicine,  
Kars, Turkey.
2. Can Oner, MD.  
Assistant Professor, Department of Family Medicine,  
Dr. Lutfi Kirdar Kartal Education and Training Hospital,  
Istanbul, Turkey.
3. Sevinc Sutlu, MD.  
Burdur Public Health Directory, Turkey.
4. Selcuk Kilinc, MD.  
Burdur Public Health Directory, Turkey.

Correspondence:

Dr. Can Oner, MD.  
Department of Family Medicine,  
Dr. Lutfi Kirdar Kartal Education and Training Hospital,  
Büyükkada Ek Hizmet Binası,  
Lala Hatun Mah. Büyükkada,  
34970 Istanbul, Turkey.  
E-mail: [trcanoner@yahoo.com](mailto:trcanoner@yahoo.com)

- \* Received for Publication: March 1, 2016
- \* Revision Received: August 20, 2016
- \* Revision Accepted: August 25, 2016

### INTRODUCTION

Spontaneous abortion is one of the most common pregnancy related adverse outcomes, it is defined as premature loss of fetus and fetal attachments -completely or partially from the uterus- up to 20 weeks of pregnancy. It is estimated that 8% of pregnancies ended in clinically recognized spontaneous abortion and this rate is estimated up to one third in clinically unrecognized pregnancies.<sup>1</sup> This rates reach up to 14% in national data.<sup>2</sup> Due to its high frequency and identification of a small potential for prevention, spontaneous abortion has significant impact on public health.<sup>3</sup>

There are many risk factors related with spontaneous abortion especially fetal malformations and chromosomal abnormalities, chronic diseases of mothers, uterine disorders, immunological factors and infections.<sup>3</sup> On the other hand several

modifiable risk factors for spontaneous abortion was also identified: Older maternal and paternal age, obesity, smoking, alcohol and caffeine consumption.<sup>4</sup> It has been shown in some studies that sociocultural factors like educational status, employment, place of residence and social classes play role in spontaneous abortion. Women with lower educational levels, unemployed women, women in lower social classes have increased risk of spontaneous abortion.<sup>3</sup>

Most of the studies about spontaneous abortions have often been conducted based on hospital databases. The important limitation of these studies is including women only who are admitted to hospitals. The elucidation of the relationship between spontaneous abortion and social factors may help us to indicate preventable factors like environmental and behavioral factors etc. It is possible to follow up pregnant women with determined socio-cultural risk factors more frequently and in a more qualified way for spontaneous abortion. But there are a few population-based studies investigating factors that affect spontaneous abortions in the literature.<sup>5</sup> The aim of this study was to determine the relationship between social factors and spontaneous abortions.

## METHODS

The study was carried out in the province of Burdur, Turkey between January 1, 2011 - December 31, 2011. Burdur is a city located at Mediterranean region of Turkey. Population of the province was 254411 in the study period and 54827 of them were women at reproductive age (15-49 years). There are 78 family health units. Approximately 3262 people benefit from each family health unit. A family health unit is a basic unit for primary health services composed on one physician and one family health midwife providing services for a maximum of 4,000 people.

A family unit is obliged to furnish primary curative, preventive and rehabilitative health services to people who are registered to them and notify the Health Care Department incident to such given services. One of the preventive health services provided by family health unit is the follow-up of pregnant women. Family physicians identify and follow up pregnant women according to national guidelines and inform the Public Health Directorate as to the termination means of pregnancy (spontaneous abortion, stillbirth, live births).

The study group of this study consisted of all women whose pregnancies were clinically

diagnosed and included to pregnancy follow-up by a physician but their pregnancies ended with spontaneous abortion between the study period (n=257). The control group consisted of women who were pregnant during the same period and whose pregnancy continued since 22 weeks and more during the study. A sample was not selected in the study group. It was decided to take two controls for every one study and the number of women to be included to the control group was calculated as 514. Matching factors, for the control group, were taken as receipt of service from the same family health care unit and living in the same area (alley or street or neighborhood) with the study group. Pregnant women lists of all family physicians were created beforehand based on the matching factor for the selection of the control group. Subsequently 514 pregnant women were identified by virtue of the random numbers table from these created lists. Two hundred and forty-nine (96.9%) of study group and 503 (97.9%) of controls have been approached. The most important reason of the failure in approaching women was address change of the participants. The study was approved by Burdur Public Health Directorate (27/04/2012-538) and all participants gave verbal informed consent.

We have prepared a data collection form including questions about the women's socio-demographic and -economic features, obstetrical history, health care properties and spousal violence. The data were collected by midwives working in the public health centers. Midwives were given a five-hour training program including important issues during the data collection phase (purpose of the study, questions, data collection methods, etc.). To minimize the possible mistakes arising from forgetting, midwives met women in study group within two weeks following spontaneous abortion. The data of the study were collected after obtaining necessary permissions from the Public Health Directorate and women's verbal consents.

Data were analyzed by SPSS 20.0 package program. Chi-squared and backward logistic regression tests were utilized in analyses. The odds ratio, and the confidence intervals (CI) were calculated. To determine factors affecting spontaneous abortions, the independent variables were analyzed with the chi-squared test. The statistically significant ( $p < 0.05$ ) variables in chi-squared test were integrated into the backward logistic regression analysis model.

## RESULTS

The study included 752 women (249 cases/503 controls). Table-I shows the distribution of demographic features on study and control groups. It can be seen that there is a statistically significant difference between the study and control groups in terms of age of the women ( $p=0.048$ ), total number of pregnancies ( $p=0.006$ ), educational status of women ( $p=0.001$ ), educational status of their husbands ( $p=0.048$ ), employment status of women ( $p=0.004$ ) and employment status of their husbands ( $p=0.038$ ).

When evaluated in terms of health feature there is a statistically significant difference between the study and control groups in terms of women's desire for pregnancy ( $p=0.043$ ), desire for women's

pregnancy by her spouse ( $p=0.014$ ) and receipt of Antenatal care (ANC) by women in the first 14 weeks ( $p=0.001$ ) (Table-II).

There is a statistically significant difference in the study group in terms of exposure to physical violence between those who had spontaneous abortion and those who had not spontaneous abortion ( $P=0.001$ ) (Table-III).

Logistic regression analysis results table, including the factors affecting spontaneous abortion is shown in Table-IV. According to this, spontaneous abortion is seen 2.3 times more in women who have received education for 5 years and less compared to women who have received education for 6 years and over (CI: 1.7 to 3.3); 2.1 times more in women who have received ANC within 14 weeks compared

Table-I: Sociodemographic features of both groups.

| Sociodemographic features     |                   | Case<br>n (%) <sup>*</sup> | Control<br>n (%) <sup>*</sup> | $\chi^2$ | P     |
|-------------------------------|-------------------|----------------------------|-------------------------------|----------|-------|
| Age of women                  | ≤19               | 16 (6.4)                   | 51 (10.1)                     | 6.092    | 0.048 |
|                               | 20-34             | 196 (78.7)                 | 402 (79.9)                    |          |       |
|                               | ≥35               | 37 (14.9)                  | 50 (9.9)                      |          |       |
| Marriage age                  | ≤19               | 102 (41.0)                 | 122 (44.1)                    | 1.800    | 0.406 |
|                               | 20-29             | 136 (54.6)                 | 267 (53.1)                    |          |       |
|                               | ≥30               | 11 (4.4)                   | 14 (2.8)                      |          |       |
| Age of first pregnancy        | ≤19               | 74 (29.7)                  | 169 (33.6)                    | 1.244    | 0.537 |
|                               | 20-29             | 160 (64.3)                 | 308 (61.2)                    |          |       |
|                               | ≥30               | 15 (6.0)                   | 26 (5.2)                      |          |       |
| Menarche age                  | ≤13               | 149 (59.8)                 | 278 (55.3)                    | 1.418    | 0.234 |
|                               | ≥14               | 100 (40.2)                 | 225 (44.7)                    |          |       |
| Total pregnancy               | 1                 | 61 (24.5)                  | 175 (34.8)                    | 10.274   | 0.006 |
|                               | 2-3               | 137 (55.0)                 | 257 (51.1)                    |          |       |
|                               | ≥4                | 51 (20.5)                  | 71 (14.1)                     |          |       |
| Place of residence            | Village           | 70 (28.1)                  | 134 (26.6)                    | 0.183    | 0.669 |
|                               | City              | 179 (71.9)                 | 369 (73.4)                    |          |       |
| Family type                   | Extended Family   | 41 (16.5)                  | 96 (19.1)                     | 0.767    | 0.394 |
|                               | Nuclear Family    | 208 (83.5)                 | 407 (80.9)                    |          |       |
| Formal marriage**             | Informal          | 4 (1.6)                    | 8 (1.6)                       | 0.001    | 0.979 |
|                               | Formal            | 243 (96.4)                 | 495 (98.4)                    |          |       |
| Kin marriage                  | Present           | 19 (7.6)                   | 36 (7.2)                      | 0.055    | 0.814 |
|                               | Not               | 230 (92.4)                 | 467 (92.8)                    |          |       |
| Count of household (person #) | 4 and below       | 213 (85.5)                 | 438 (87.3)                    | 0.421    | 0.516 |
|                               | 5 and above       | 36 (14.5)                  | 64 (12.7)                     |          |       |
| Education level of woman      | 5 years and below | 113 (45.4)                 | 146 (29.0)                    | 19.732   | 0.001 |
|                               | 6 years and above | 136 (54.6)                 | 357 (71.0)                    |          |       |
| Education level of man        | 5 years and below | 74 (29.7)                  | 116 (23.1)                    | 3.909    | 0.048 |
|                               | 6 years and above | 175 (70.3)                 | 387 (76.9)                    |          |       |
| Working status of woman       | Employed          | 47 (18.9)                  | 56 (11.1)                     | 8.446    | 0.004 |
|                               | Unemployed        | 202 (81.1)                 | 447 (88.9)                    |          |       |
| Working status of man         | Employed          | 225 (90.4)                 | 475 (94.4)                    | 4.290    | 0.038 |
|                               | Unemployed        | 24 (9.6)                   | 28 (5.6)                      |          |       |
| Health insurance of woman     | Non               | 9 (3.6)                    | 13 (2.6)                      | 0.622    | 0.430 |
|                               | Present           | 240 (96.4)                 | 490 (97.4)                    |          |       |
| Total                         | 249 (100.0)       | 503 (100.0)                |                               |          |       |

\*column percentage, \*\* 2 missing data from study group, #1 missing data from control group.

Table-II: Health features of women.

| <i>Health features</i>                |                      | <i>Study</i>  | <i>Control</i> | $\chi^2$ | <i>P</i> |
|---------------------------------------|----------------------|---------------|----------------|----------|----------|
|                                       |                      | <i>n (%)*</i> | <i>n (%)*</i>  |          |          |
| Unintended pregnancy (woman)          | Yes                  | 25 (10.0)     | 30 (6.0)       | 4.082    | 0.043    |
|                                       | No                   | 224 (90.0)    | 473 (94.0)     |          |          |
| Unintended pregnancy (man)**          | Yes                  | 22 (8.9)      | 22 (4.4)       | 6.091    | 0.014    |
|                                       | No                   | 226 (91.1)    | 481 (95.6)     |          |          |
| Pregnancy type                        | Normal               | 233 (93.6)    | 473 (94.0)     | 0.062    | 0.804    |
|                                       | Assisted techniques  | 16 (6.4)      | 30 (6.0)       |          |          |
| Diagnostic procedure of pregnancy     | Urine samples        | 74 (29.7)     | 163 (32.4)     | 1.413    | 0.493    |
|                                       | Blood samples        | 153 (61.4)    | 287 (57.1)     |          |          |
|                                       | USG                  | 22 (8.8)      | 53 (10.5)      |          |          |
| Antenatal care within first 14 weeks  | No                   | 42 (16.9)     | 45 (8.9)       | 10.215   | 0.001    |
|                                       | Yes                  | 207 (83.1)    | 458 (91.1)     |          |          |
| Contraception method before pregnancy | Any                  | 109 (43.8)    | 231 (45.9)     | 1.133    | 0.568    |
|                                       | Modern methods       | 79 (31.7)     | 166 (33.0)     |          |          |
|                                       | Conventional methods | 61 (24.5)     | 106 (21.1)     |          |          |
| Rh incompatibility $\neq$             | Yes                  | 23 (9.5)      | 47 (9.4)       | 0.004    | 0.950    |
|                                       | No                   | 218 (90.5)    | 453 (90.6)     |          |          |
| Chronic disease of woman              | Yes                  | 18 (7.2)      | 41 (8.2)       | 0.196    | 0.658    |
|                                       | No                   | 231 (92.8)    | 462 (91.8)     |          |          |
| Genital system operation history      | Yes                  | 8 (3.2)       | 30 (6.0)       | 2.628    | 0.105    |
|                                       | No                   | 241 (96.8)    | 473 (94.0)     |          |          |
| Genital infection history             | Yes                  | 56 (22.5)     | 102 (20.3)     | 0.491    | 0.484    |
|                                       | No                   | 193 (77.5)    | 401 (79.7)     |          |          |
| Drug use                              | Yes                  | 27 (10.8)     | 43 (8.5)       | 1.039    | 0.308    |
|                                       | No                   | 222 (89.2)    | 460 (91.5)     |          |          |
| Menstrual irregularity                | Yes                  | 24 (9.6)      | 67 (13.3)      | 2.122    | 0.145    |
|                                       | No                   | 225 (90.4)    | 436 (86.7)     |          |          |
| Total                                 |                      | 249 (100.0)   | 503 (100.0)    |          |          |

\*column percentage, \*\*1 missing data from study group,

$\neq$  8 missing data form study and 3 missing data from control group.

Table-III: Health behaviors of couples.

| <i>Health behaviors and domestic violence</i> |     | <i>Study</i>  | <i>Control</i> | $\chi^2$ | <i>P</i> |
|---|-----|---------------|----------------|----------|----------|
|   |     | <i>n (%)*</i> | <i>n (%)*</i>  |          |          |
| Smoking (women)                               | Yes | 25 (10.0)     | 57 (11.3)      | 0.286    | 0.593    |
|   | No  | 224 (90.0)    | 446 (88.7)     |          |          |
| Passive smoking (Women)                       | Yes | 82 (32.9)     | 139 (27.6)     | 2.252    | 0.133    |
|   | No  | 167 (67.1)    | 364 (72.4)     |          |          |
| Alcohol (Women)                               | Yes | 3 (1.2)       | 3 (0.6)        | 0.779    | 0.377    |
|   | No  | 246 (98.8)    | 500 (99.4)     |          |          |
| Coffee (Women)                                | Yes | 43 (17.3)     | 71 (14.1)      | 1.288    | 0.256    |
|   | No  | 206 (82.7)    | 432 (85.9)     |          |          |
| Smoking (men)                                 | Yes | 136 (54.6)    | 287 (57.1)     | 0.403    | 0.526    |
|   | No  | 113 (45.4)    | 216 (42.9)     |          |          |
| Alcohol (men)                                 | Yes | 83 (33.3)     | 171 (34.0)     | 0.033    | 0.857    |
|   | No  | 166 (66.7)    | 332 (66.0)     |          |          |
| Verbal violence **                            | Yes | 63 (25.3)     | 112 (22.3)     | 0.833    | 0.361    |
|   | No  | 186 (74.7)    | 390 (77.7)     |          |          |
| Sexual violence**                             | Yes | 28 (11.3)     | 37 (7.4)       | 3.222    | 0.073    |
|   | No  | 220 (88.7)    | 465 (92.6)     |          |          |
| Physical violence                             | Yes | 38 (15.3)     | 37 (7.4)       | 11.592   | 0.001    |
|   | No  | 211 (84.7)    | 466 (92.6)     |          |          |
| Total   |     | 249 (100.0)   | 503 (100.0)    |          |          |

\*column percentage, \*\*1 missing data from both study and control group.

Table-IV: Result of Logistic regression analyses.

| <i>Independent variables</i>   |                  | <i>Odds Ratio</i> | <i>%95 CI</i> |
|--------------------------------|------------------|-------------------|---------------|
| Education level of women       | 5 years or below | 2.3               | 1.7-3.3       |
|                                | 6 years or above | 1 (reference)     |               |
| Working status of women        | Employed         | 2.2               | 1.4-3.5       |
|                                | Unemployed       | 1(reference)      |               |
| Physical violence              | Yes              | 2.0               | 1.2-3.4       |
|                                | No               | 1(reference)      |               |
| Use of Antenatal care services | No               | 2.1               | 1.3-3.4       |
|                                | Yes              | 1(reference)      |               |

to women who have not received ANC within 14 weeks (CI: 1.3 to 3.4); 2.2 times more in working women compared to women who are not working (CI: 1.4 to 3.5) and 2.0 times more in women who experience physical violence compared to women who do not experience physical violence (CI: 1.2 to 3.2).

## DISCUSSION

Several independent variables possibly affecting spontaneous abortion were examined in our study. As a result four variables were defined as risk factors for spontaneous abortion: Educational (OR: 2.3; CI=1.7-3.3) and employment status of women (OR:2.2; CI=1.4-3.5), physical violence (OR:2.0; CI:1.2-3.4) and access to antenatal care within 14 week of pregnancy (OR:2.1; CI:1.3-3.4).

We found out in this study that spontaneous abortion is 2.3 times more in women with  $\leq 5$  years of education compared to women who have  $\geq 6$  years. In a recent study socioeconomic position and the risk of spontaneous abortion was investigated. It was reported that women with  $<10$  years of education has 1.19 times (CI:1.05-1.35) more elevated risk of spontaneous abortion compared. -with women with  $>12$  years of education.<sup>3</sup> On the other hand, there are also studies indicating no relationship between spontaneous abortion and educational level.<sup>6,7</sup> We believe that low educational level is effective on the risk of spontaneous abortion due to late recognition of danger signs during pregnancy and late admission to the hospital.<sup>8</sup> Women's educational level is also directly related with household wealth and empowers women in household decision making.<sup>9</sup>

The relationship between employment statuses of women with miscarriage is not obvious in literature. In a study from Japan, it was reported that spontaneous abortion is seen 1.65 times more in employed mothers.<sup>10</sup> But in another study it was shown that unemployed women had the same risk of spontaneous abortion as the employed women.<sup>3</sup>

Adel et al noted an increased risk of miscarriage in unemployed group compared employed ones.<sup>7</sup> This difference is due to the employment status of women in different country and difference of study methodology. We found in this study that spontaneous abortion is seen 2.2 times more in employed women.

We thought that employment status of women plays an important role in miscarriage. In a recent study in European Union it was demonstrated that 16% of employed women works in shifts, 13% work at night and 16% work more than 40 hours a week. Moreover 15% women works in tiring or painful positions and 23% of women carry or move heavy loads<sup>11</sup>. The national data shows that significant proportion of women work in agricultural and private sectors (especially textile and service sectors) and mainly informally (black economy).<sup>12</sup> The link between miscarriage and employment is due to working conditions, ergonomics and its effect on social class. Miscarriage in employed women are thought to be related with prolonged work, working in different shifts and night work, heavy lifting, wrong posture during work and working for a long time standing.<sup>13,14</sup>

In our study spontaneous abortion was seen two times more in spousal violence exposed women compared to others. Similar to our result in a recent national study it was revealed that women who experienced physical violence were 2.5 times more (OR =2.47, CI:1.37-4.84) experienced miscarriage who did not expose physical violence.<sup>15</sup> Spontaneous abortion was 1.4 to 1.8 times more in spousal violence exposed women.<sup>16,17</sup> Direct effect of spousal violence is mechanical trauma which ends with spontaneous abortion.<sup>18</sup> Moreover indirectly women exposed to spousal violence have lower health and social status<sup>19</sup> and they do not take ANC or postpone.<sup>10</sup>

It is known that women who do not use ANC have more risk of death, delivering low weight babies and more likely to lose their babies in prenatal

period.<sup>20</sup> Our study reveals that spontaneous abortion is seen 2.1 times more in women who do not use ANC within the first 14 weeks. High risk pregnancies could be determined by ANC and their follow up can be made properly so the pregnancy complications can be decreased. Furthermore, adequate information about “signs of danger in pregnancy” can be given to women who use ANC. It was reported that educational status of women and spouse, household income, employment status of women and socio-cultural factors affect the use of ANC.<sup>21</sup>

The strength of this study is inclusion of women with spontaneous abortion within two weeks to minimize the possible mistakes arising from forgetting. Another strength is examining the relation of spontaneous abortions with social and cultural factors. The main limitation of this study was enrollment of only clinically recognized pregnancies ending with spontaneous abortions, so our result may not be generalized for all of spontaneous abortions.

In conclusion, five years or less educational level, employment of women, non-using of ANC during the early period of gestation and spousal violence during pregnancy have been identified as the risk factors for spontaneous abortions. In this context, pregnant women with these risk factors should be followed up more frequently and in a more qualified way.

**Funding statement:** This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

**Declaration of interest:** None.

## REFERENCES

- Sapra KJ, Buck Louis GM, Sundaram R, Joseph KS, Bates LM, Galea S, et al. Signs and symptoms associated with early pregnancy loss: findings from a population-based preconception cohort. *Hum Reprod.* 2016;31(4):887-896. doi: 10.1093/humrep/dew010.
- Hacettepe University Institute of Population Studies. “2013 Turkey Demographic and Health Survey”. Hacettepe University Institute of Population Studies, T.R. Ministry of Development and TUBITAK, Ankara, Turkey. 2014.
- Norsker FN, Espenhain L, Rogvi S, Morgen SC, Andersen PK, Andersen AMN. Socioeconomic position and the risk of spontaneous abortion: a study within the Danish National Birth Cohort. *BMJ.* 2012;2:1-5. doi:10.1136/bmjopen-2012-001077.
- Bhattacharya S. Modifiable risk factors for miscarriage identified. *Evid Based Nurs Month.* 2015. doi: 10.1136/ebnurs-2014-102030
- Everett C. Incidence and outcome of bleeding before 20th of pregnancy: prospective study from general practice. *BMJ.* 1997;315:32-34.
- Maconochie N, Doyle P, Prior S. Risk factors for first trimester miscarriage results from a UK population based case control study. *Br J Obstet Gynecol.* 2007;114:170-186.
- Adel LM, Farajallah S, Al-Shanableh Z, Issa F, Al-ani D, Muttappallymyalil J, et al. Determinants of spontaneous abortion: A hospital based case control study in Ajman, UAE. *GMJ.* 2015;4(52):s24-s35.
- Okour A, Alkhateeb M, Amarin Z. Awareness of danger signs and symptoms of pregnancy complication among women in Jordan. *Int J Gynaecol Obstet.* 2012;118:11-14. doi: 10.1016/j.ijgo.2012.01.020.
- Ahmed S, Ray R. Determinants of pregnancy and induced and spontaneous abortion in a jointly determined framework: Evidence from country-wide, district level household survey in India. *J Biosoc. Sci.* 2014;46:480-517. doi:10.1017/S0021932013000369
- Baba S, Noda H, Nakayama M, Waguri M, Mitsuda N, Iso H. Risk factors of early spontaneous abortions among Japanese: a matched case-control study. *Hum Reprod.* 2011;26(2):466-472. doi: 10.1093/humrep/deq343.
- Lindbohm ML. Physical workload – a risk factor for miscarriage. *Scand J Work Environ Health.* 2013;39(4):321-323. doi: 10.5271/sjweh.3369
- The Ministry of Family and Social Policies General Directorate on the Status of Women. Analysis of Women’s Labor Force Profile Statistics in Turkey 2014; First Published, 2014, Ankara Print Duygu Matbaacılık
- Bonde JP, Jorgensen KT, Bozini M, Palmer KT. Miscarriage and occupational activity: a systematic review and meta analysis regarding shift work, working hours, lifting, standing and physical work load. *Scand J Work Environ Health.* 2013;39:325-334. doi:10.5271/sjweh.3337.
- Zhu JL, Hjollund NH, Anderson AN, Olsen J. Shift work, job stress, and late fetal loss: the national birth cohort in Denmark. *J Occup Environ Med.* 2004;46:1144 -1149.
- Nur N. Association between domestic violence and miscarriage: a population-based cross sectional study among women of childbearing ages, Sivas, Turkey. *Women Health.* 2014;54(5):425-438. doi: 10.1080/03630242.2014.897676
- Johri M, Morales RE, Boivin JF, Samayoa BE, Hoch JS, Grazioso CF, et al. Increased risk of miscarriage among women experiencing physical or sexual intimate partner violence during pregnancy in Guatemala City, Guatemala: cross-sectional study. *BMC Pregnancy Childbirth.* 2011;11:49. doi: 10.1186/1471-2393-11-49.
- Stöckl H, Filippi V, Watts C, Mbwanjo JKK. Induced abortion, pregnancy loss and intimate partner violence in Tanzania: A population based study. *BMC Pregnancy Childbirth.* 2012;12:12. doi:10.1186/1471-2393-12-12
- World Health Organization. Intimate partner violence during pregnancy: information sheet <http://www.who.int/iris/handle/10665/70764>
- Abramsky T, Watts CH, Garcia-Moreno C, Devries K, Kiss L, Ellsberg M, et al. What factors are associated with recent intimate partner violence? Findings from the WHO multicountry study on women’s health and domestic violence. *BMC Public Health.* 2011;11:109. doi:10.1186/1471-2458-11-109
- Simkhada B, Tejkingen ER, Porter M, Simkhada P. Factors affecting the utilization of antenatal care in developing countries: systematic review of the literature. *J Adv Nurs.* 2008;61:244-260.
- Titaley CR, Dibley MJ, Roberts CL. Factors associated with underutilization of antenatal care services in Indonesia: results of Indonesia Demographic and Health Survey 2002/2003 and 2007. *BMC Public Health.* 2010;10:485. doi: 10.1186/1471-2458-10-485.

**Author’s Contribution:** **BC:** Conceived, designed, statistical analysis, editing of manuscript. **CO:** Statistical analysis, editing manuscript, review of manuscript. **SS, SK:** Design, data collection, editing of manuscript. **CO:** Takes the responsibility and is accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.