

## Women's Psychological Stress and Obstetric Disorders

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ARTICLE INFO	ABSTRACT
<p><i>Article type:</i> Original article</p> <hr/> <p><i>Article History:</i> Received: 07-Apr-2015 Accepted: 18-Aug-2015</p> <hr/> <p><i>Key words:</i> Obstetric disorders Placental abruption Psychological stress Spontaneous abortion</p>	<p><b>Background &amp; aim:</b> Occupational exposures can cause problems such as reproductive system disorders; however, the effects of some exposures, such as psychological stress, have not been investigated yet. This study aims to investigate the effects of women's psychological stress on obstetric disorders.</p> <p><b>Methods:</b> This historical cohort study was conducted on 1400 working women in Mashhad, Iran. Data collection was conducted through completing a check list and a questionnaire on psychological stress and obstetric disorders as well as subsequent interviews with participants on health issues. After completing the questionnaire, the participants were divided into four groups according to their level of psychological stress. Frequencies of reproductive disorders were compared among the four groups. To analyze the data, t-test, ANOVA, Chi-squared and Fisher's exact tests were carried out using SPSS. P-value less than 0.05 was considered significant.</p> <p><b>Results:</b> The results showed that group four with the most severe psychological stress and the lowest age had the highest risk of reproductive disorders including spontaneous abortion and placental abruption.</p> <p><b>Conclusion:</b> In this study, severe stress had a significant relationship with the risk of some obstetric complications. It is therefore recommended to use stress management techniques in order to reduce psychological stress, which in turn could prevent its adverse effects.</p>

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### Introduction

Psychological stress is one of the important risk factors for reproductive disorders about which, few studies have been conducted (1). However, there are plenty of studies on the environmental risk factors for reproductive disorders such as occupational risks (2-5). It is suggested that exposure to some physical factors such as ionizing radiation and electromagnetic fields can cause the reproductive disorders. Exposure to chemicals can also affect reproductive system, especially pregnancy outcome (2).

Sznajder et al. investigated gynecological pain associated with occupational stress among female factory workers (3). Some studies such as Larsen et al.'s study demonstrated psychosocial job strain as a risk factor for congenital malformations in pregnancy outcomes (4, 5). Another study was carried out on the effects of stress on rural pregnant

women. It was found that they had some stressors, and priorities for stress reduction (6).

Some studies were conducted on physiological effects of working on women. Bilhartz and Bilhartz suggested that occupation could be a risk factor for hypertensive disorders in pregnancy (7). Reza et al. showed the prevalence of female health disorders related to psychological stress (8). Some other studies have investigated the role of maternal stress in congenital malformations and disorders in children; for instance, van Dijk et al. studied the relationship between prenatal stress and the balance of a child's cardiac autonomic nervous system at 5-6 years of age (9). Robinson et al. demonstrated the relationship between the prenatal stress and the risk of behavioral morbidity from age 2 to 14 (10). Moreover, van Dijk et al. demonstrated the cardio-metabolic risk in 5-year-old children, who were prenatally

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exposed to maternal psychosocial stress (11).

Larsen et al. studied the association between psychosocial job strain and adverse birth outcomes (12). Han et al. demonstrated the relationship among occupational stress, negative life events and low birth weight (13). Howell et al. determined the modifiable factors associated with changes in postpartum depression symptoms (14).

Goodman and Tully showed the recurrence of depression during pregnancy in accordance with psychosocial and personal functioning correlates (15).

Some scientists studied mothers' mental and physical background during pregnancy and the effect of fatigue on the outcome (16-19). It was found that musculoskeletal disorders were related to mental stress and they had a significant relationship with reproductive outcome (20). Physicians themselves had experienced this situation that is, they had suffered from stress and the related disorders (21).

Shift working is an important risk factor for disrupting the circadian rhythm (22-24), which is related to mental disturbances. Some other studies investigated the effects of shift working on health (25, 26). Given the fact that the exact effect of psychological stress on reproduction remains unknown, the aim of this study is to determine the effects of women's psychological stress on obstetric disorders.

## Materials and Methods

This historical cohort study was performed on 1400 working women with different jobs from different workplaces in Iran during 2010-2014. The participants were selected through random clustered sampling from different settings. According to previous studies in this field,  $\alpha = 0.05$ ,  $\beta = 0.80$ ,  $P1 = 15\%$  and  $P2 = 45\%$ , for reproduction disorders in women without stress and with stress (2, 29).

The inclusion criterion was women who had been employed for at least three years. Moreover, the exclusion criteria were: experiencing previous preterm delivery, placental abruption, premature rupture of membrane, fetal defect, low birth weight, infertility, menorrhagia, spontaneous abortion, before they had begun their job or had psychological disorders.

Moreover, these women were assessed for not having any physical or chemical exposures and ergonomic or mechanical risks such as standing for long periods of time while working.

Psychological stress was evaluated using the Work Environment Scale, which is a standard scaling checklist (27-29). The dimensions of the checklist consisted of decision making, mental requirement, changing, career development, tasks, responsibility, harmony with coworkers, quality of supervision, aims and goals, role as a special or general worker or employee in shift work. There were ten levels of occupational stress with ranging from 1 to 10.

After taking oral consent from the participants, the questionnaire was filled out. Subsequently, using the collected data, the participants were divided into four groups as follows: group +1: mild, group +2: moderate, group +3: moderate to severe and group +4: severe to very severe psychological stress, and the stress grades were: group +1: 25%, group +2: 26-50%, group +3: 51-75% and group +4: 76-100%.

## Questionnaire design

The questionnaire was designed using interviews with 1400 working women. To assess the validity of the questionnaire, 32 health and medical sciences professors from different universities gave their opinions regarding the items of the questionnaire, then a pilot study was performed with 30 people and showing correlation coefficient of 86% (2).

This questionnaire included items on preterm delivery, placental abruption, premature rupture of membrane (PROM), infertility, spontaneous abortion, fetal defect and low birth weight. The questionnaire also determined the occupational and non-occupational risk factors for reproductive disorders. Non-occupational risk factors include age, body mass index (BMI), family history, gynecological and endocrine disorders, and occupational risk factors consist of occupational psychological stress, exposure to chemical and physical factors and shift work.

The four groups were observed for gravidity and age. The data were collected using a checklist (Work Environment Scale) and a self-regulated questionnaire on health issues. The

researcher explained all the items of the questionnaire for the participants. Moreover, the pregnancies were followed-up.

### Statistical analysis

Data were analysed performing descriptive analysis, t-test and ANOVA for quantitative variables, Chi-squared and Fisher's exact tests for qualitative variables and Mantel- Haenszel test was used for controlling age groups, cross tabulation and determination of relative risks, using SPSS, version 16. P-value less than 0.005 was considered significant.

### Results

It was found that group +1 had the highest mean age, which was  $34.06 \pm 3.96$  years, and the lowest mean age was in group +4 with  $26.32 \pm 1.82$  years. The longest working hours belonged to group +1 with  $12.33 \pm 3.68$  hours and the shortest was for group +4 with a mean

of  $6.59 \pm 1.26$  hours. There was a significant difference between the two groups ( $P < 0.05$ ). BMI was  $24.02 \pm 0.40$  in group +1, which was the highest among the four groups. Table 1 shows the mean and a comparison of variables among the four groups.

Table 2 shows the comparison of reproductive disorders among the four groups. Preterm delivery was more frequent in group +4, and the rates of spontaneous abortion and low birth weight were higher in group +1; however, the difference between the two groups was not significant. Table 3 demonstrates the different risks for obstetrics disorders for each group.

After deletion of age group effect, the relative risk for spontaneous abortion and placental abruption was found to be significant in group +4. The relative risks for spontaneous abortion and placental abruption were 2.63 (1.09-6.31) and 4.29 (1.85-9.95), respectively.

**Table 1.** Mean of variables and comparison of the four groups with graded psychological stress ( $P < 0.05$ )

Variables	Group 1 $\mu \pm SD$	Group 2 $\mu \pm SD$	Group 3 $\mu \pm SD$	Group 4 $\mu \pm SD$	ANOVA(F)	P-value
Age	$34.06 \pm 3.96$	$27.20 \pm 3.82$	$30.00 \pm 9.98$	$26.32 \pm 1.82$	107.46	$< 0.001$
Work duration	$12.33 \pm 3.68$	$7.86 \pm 2.19$	$8.00 \pm 2.82$	$6.59 \pm 1.26$	71.57	$< 0.001$
Body mass index	$24.02 \pm 0.40$	$22.00 \pm 0.1$	$22.10 \pm 0.1$	$22.06 \pm 0.39$	35.71	0.07
Age at disorder	$24.50 \pm 5.26$	$23.04 \pm 1.23$	$23.12 \pm 3.01$	$22.03 \pm 1.20$	24.65	0.08
Gravidity	$2.2 \pm 0.5$	$1.65 \pm 0.77$	$1.5 \pm 1.4$	$1.5 \pm 0.78$	22.52	0.9

**Table 2.** Comparison of reproductive disorders among the four groups with graded psychological stress ( $P < 0.05$ )

Disorders	Group 1 N (%)	Group 2 N (%)	Group 3 N (%)	Group 4 N (%)	Chi-squared or Exact Fisher's tests	P-value
Preterm delivery	4 (1.1)	3 (0.8)	3 (0.8)	5 (1.4)	-	0.24
Placental abruption	0	0	0	2 (0.5)	-	0.25
Spontaneous abortion	12 (3.4)	5 (1.4)	6 (1.7)	10 (2.8)	7.38	0.06
Fetal defect	3 (0.8)	0	2 (0.5)	3 (0.8)	-	0.24
Low birth weight	6 (1.7)	3 (0.8)	4 (1.1)	5 (1.4)	2.57	0.30
Premature rupture of membrane	3 (0.8)	2 (0.5)	2 (0.5)	3 (0.8)	-	0.67

**Table 3.** The relative risks of reproductive disorders in the four groups with graded psychological stress ( $P < 0.05$ )

Disorders	Group 1 RR (CI)	Group 2 RR (CI)	Group 3 RR (CI)	Group 4* RR (CI)
Preterm delivery	0.32 (0.06-1.64)	0.48 (0.05-3.03)	0.49 (0.18-3.10)	3.92 (0.77-19.81)
Placental abruption	-	-	-	4.86 (4.01-5.90)
Spontaneous abortion	0.337 (0.14-0.79)	2.66 (0.56-12.59)	0.49 (0.13-1.77)	2.63 (1.09-6.31)
Fetal defect	0.32 (0.06-1.64)	0.34 (0.06-1.54)	0.49 (0.08-3.00)	3.92 (0.77-19.81)
Low birth weight	0.49 (0.13-1.77)	0.33 (0.05-1.65)	0.34 (0.16-1.54)	2.62 (0.72-9.52)
Premature rupture of membrane	0.49 (0.08-3.00)	0.35 (0.07-1.64)	0.47 (0.07-3.00)	2.58 (0.42-15.72)

\* Group 4 in contrast with the other groups

## Discussion

According to the results, group +4 with very severe psychological stress had the highest risk of disorders such as spontaneous abortion and placental abruption and the lowest age. The frequency of some disorders such as spontaneous abortion and low birth weight was the highest in group +1 with mild psychological stress, but the mean age in group +1 was  $34.06 \pm 3.96$ , suggesting that the reproductive disorders in this group might be due to aging effect, this group had the longest working hours, as well.

After eliminating age effect, the actual risk of psychological stress was prominent. The results of this study are in line with the other studies investigating the effect of psychological stress on reproductive system (4-7).

This study shows the effects of stress on pregnancy outcome (12, 13), spontaneous abortions, placental abruption and menorrhagia (2). It was found that the risk of disorders was the highest in stressful work situations, especially in shift works. (25, 26). This risk can be modified through psychologist consultation in stressful situations and workplaces. The non-occupational risk factors for reproductive system, which are important factors in workers' future health, must be questioned before starting a job (2, 29).

All of the reproductive disorders such as spontaneous abortion, fetal defects, low birth weight, placental abruption, premature rupture of membrane (PROM), preterm delivery and menorrhagia, were studied for other etiologies prior to beginning the study. All the work place risks were in permissible exposure levels, except for psychological stress which was different in various work settings. The participants of this study were from different workplaces with different types of psychological stresses. However, irrespective of the work setting, physicians can help with prevention, screening, treatment and rehabilitation of reproductive disorders.

Paying attention to stressful situations at home is important too, which should be asked about by psychologists from the people with stress disorders. Moreover, age of pregnancy is an important risk factor for obstetric disorders, as well. But the women with stressful jobs are

at high risk of disorders such as placental abruption and spontaneous abortion of the fetus; therefore, they must be screened for reproductive system health.

Limitations of our study include: not having an exact job analysis and these data were gathered from personnel's memory and health issues. Unfortunately, the sample size after implementing the exclusion criteria became small. It seems that further studies with exact job analysis will be helpful.

## Conclusion

This study shows that very severe stress causes high risk of spontaneous abortion and placental abruption. Thus, stress management techniques should be applied for decreasing the risk of obstetric disorders.

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## Conflict of Interest

The authors declare no conflicts of interest.

## References

1. Windham GC, Osorio AMF. Female Reproductive Toxicology. In: LaDou J. Current Occupational & Environmental Medicine. New York: Mc Graw-Hill Companies; 2004. P.397-413
2. Assadi SN. Is being a health-care worker a risk factor for women's reproductive system? *International Journal of Preventive Medicine* 2013; 4(7):852-857.
3. Sznajder KK, Harlow SD, Burgard SA, Wang Y, Han C, Liu J. Gynecologic pain related to occupational stress among female factory workers in Tianjin, China. *International Journal of Occupational Medicine and Environmental Health* 2014; 20(1):33-45.
4. Larsen AD, Hannerz H, Thulstrup AM, Bonde JP, Obel C, Hougaard KS. Psychosocial job strain and risk of congenital malformations in offspring—a Danish National cohort study. *An International Journal of Obstetrics and Gynaecology* 2014; 121(7):830-838.
5. Larsen AD, Hannerz H, Juhl M, Obel C, Thulstrup AM, Bonde JP, et al. Psychosocial job strain and risk of adverse birth outcomes: a study within the Danish national birth cohort. *Occupational and Environmental Medicine* 2013; 70(12):845-851.

6. Bloom TL, Bullock LF, Parsons L. Rural pregnant women's stressors and priorities for stress reduction. *Issues in Mental Health Nursing* 2012; 33(12):813-819.
7. Bilhartz TD, Bilhartz P. Occupation as a risk factor for hypertensive disorders of pregnancy. *Journal of Women's Health* 2013; 22(2):188a-i.
8. Reza A, Sievert LL, Rahberg N, Morrison LA, Brown DE. Prevalence and determinants of headaches in Hawaii: the Hilo Women's Health Study. *Annals of Human Biology* 2012; 39(4):305-314.
9. van Dijk AE, van Eijsden M, Stronks K, Gemke RJB, Vrijkotte TGM. Prenatal stress and balance of the child's cardiac autonomic nervous system at age 5-6 years. *PLoS ONE* 2012; 7(1):e30413.
10. Robinson M, Mattes E, Oddy WH, Pennell CE, van Eekelen A, McLean NJ, et al. Prenatal stress and risk of behavioral morbidity from age 2 to 14 years: the influence of the number, type, and timing of stressful life events. *Development and Psychopathology* 2011; 23(2):507-520.
11. van Dijk AE, van Eijsden M, Stronks K, Gemke RJ, Vrijkotte TG. Cardio-metabolic risk in 5-year-old children prenatally exposed to maternal psychosocial stress: the ABCD study. *BMC Public Health* 2010; 10:251.
12. Larsen AD, Hannerz H, Obel C, Thulstrup AM, Bonde JP, Hougaard KS. Testing the association between psychosocial job strain and adverse birth outcomes--design and methods. *BMC Public Health* 2011; 11:255.
13. Han K, Huang XR, Tan HL, Peng XS, Chen Q, Zhang JP, et al. Relationship of occupational stress and negative life events with low birth weight. *Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi* 2008; 26(9):518-521. (Chinese)
14. Howell EA, Mora PA, DiBonaventura MD, Leventhal H. Modifiable factors associated with changes in postpartum depressive symptoms. *Archives of Women's Mental Health* 2009; 12(2):113-120.
15. Goodman SH, Tully EC. Recurrence of depression during pregnancy: psychosocial and personal functioning correlates. *Depression and Anxiety* 2009; 26(6):557-567.
16. McGovern P, Dowd B, Gjerdingen D, Dagher R, Ukestad L, McCaffrey D, et al. Mothers' health and work-related factors at 11 weeks postpartum. *Annals of Family Medicine* 2007; 5(6):519-527.
17. Makowiec-Dabrowska T, Koszoda-Włodarczyk W. The CIS20R Questionnaire and its suitability for prolonged fatigue studies. *Medycyna Pracy Journal* 2006; 57(4):335-345. (Polish)
18. Hillis SD, Anda RF, Dube SR, Felitti VJ, Marchbanks PA, Marks JS. The association between adverse childhood experiences and adolescent pregnancy, long-term psychosocial consequences, and fetal death. *The Journal of Pediatrics* 2004; 113(2):320-327.
19. Rauchfuss M, Gauger U. Biopsychosocial predictors of preterm labor and preterm delivery? Results of a prospective study. *Zentralbl Gynakol* 2003; 125(5):167-178.
20. Kishi R, Kitahara T, Masuchi A, Kasai S. Work-related reproductive, musculoskeletal and mental disorders among working women--history, current issues and future research directions. *Industrial Health* 2002; 40(2):101-112.
21. Levey RE. Sources of stress for residents and recommendations for programs to assist them. *Academic Medicine* 2001; 76(2):142-150.
22. Sellix MT. Circadian Clock Function in the Mammalian Ovary. *Journal of Biological Rhythms* 2014; 30(1):7-19.
23. Hansen J. Night shiftwork and breast cancer survival in Danish women. *Occupational and Environmental Medicine* 2014; 71 Suppl 1:A26.
24. Baker FC, Driver HS. Circadian rhythms, sleep, and the menstrual cycle. *sleep Medication* 2007; 8(6):613-622.
25. Andersen E. Health effects of shiftwork-a focus on health care providers. *American Association of Occupational Health Nursing* 2005; 53(6):239-240.
26. Labyak S, Lava S, Turek F, Zee P. Effects of shiftwork on sleep and menstrual function in nurses. *Journal of The International Council on Women's Health* 2002; 23(6-7):703-714.
27. Assadi SN. Cardiovascular disorders risk factors in different industries of Iran. *International Journal of Preventive Medicine* 2013; 4(6):728-733.
28. Assadi SN, Esmaily H, Mostaan L. Comparison of sensory-neural hearing between firefighters and office workers. *International Journal of Preventive Medicine* 2013; 4(1):115-119.
29. Assadi SN. Risk of early menopausal symptoms in clinical workers. *Iranian Journal of Nursing and Midwifery Research* 2014; 19(6):569-573.