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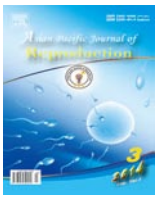

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Association between maternal work activity on birth weight and gestational age

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ABSTRACT

Objective: To evaluate the effect of maternal employment on birth weight and gestational age. **Methods:** In this project, 1 272 pregnant women were recruited from whom referred to Tehran hospitals during 1 year via randomized sampling. Data were gathered through history taking and medical records. In this study, 564 employed women were classified as exposure group and 708 housekeepers were as the control group. *Chi* square test, *t*-test, One-way ANOVA and logistic regression were used to analyze data. **Results:** In this study, mean mother age was 25.01 years and mean birth weight was (2 884±684) g. The mean birth weight in housekeepers was significantly higher (2 991±457 g) than employees (2 726±476 g) (P=0.002). The infants' mean birth weights in farmer were the lowest and in office workers (2 831±526 g) was the highest (P<0.01). Gestational age less than 37 weeks was more common among employees. The mean birth weight decreased when the working hours increased (P<0.01). In those mothers who were working less than 3 months there were a higher mean birth weight (P<0.01). Also the mean birth weight decreased due to the hours of standing during a day. **Conclusion:** Women employment during pregnancy has an important role in low birth weight and preterm labor compared to those who do not work.

1. Introduction

Gestational period is an important part in human development. This period should be monitored and evaluated because of its importance and the effects of environmental factors which can lead to major defects detected after birth[1].

Human growth and development in first years of life especially birth weight has great correlation with post neonatal, childhood growth and even various disease including malignancies[2].

It is estimated that about 20% of united states neonates are born in upper and lower limits of fetal growth annually. Half of these numbers are infants with low birth weight (LBW=less than 2 500 grams) which their intrauterine growth is impaired[2,3].

Work's influence on preterm labor is controversial. Very hard labor seems to be one of the independent risk factors of preterm neonates[4]. Evidences including maternal work's influences on neonatal health are not the same. There are several evidences which have considered beneficial influence of working on pregnancy and its outcomes. Working mother seems to have better pregnancy experiences comparing to the non-working mothers. Moreover, some studies reported lower risk of preterm

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labour in working mother. However, workplace injuries leading to known maternal or fetal complications are also reported[1].

Women's working field has been developed in recent decades. In modern societies, women role is not limited to bearing children, family care and housework. Today, many women chose higher education and high level or hard jobs. Increasing women's responsibilities due to these lifestyle changes could likely increase the physical and mental fatigue[5].

2. Materials and methods

In this study, 1 272 pregnant women were recruited from those which were referred to Tehran hospitals during October 2009 up to October 2010 for delivery, throughout a simple randomized sampling and after ruling out the exclusion criteria. Exclusion criteria were: mother age less than 16 and more than 35 years-old, history of intrauterine growth retardation (IUGR), a history of small for gestational age infants (SGA), anti-phospholipids antibody syndrome, inadequate maternal nutrition during pregnancy, history of fetal infections, congenital anomalies in infants, contact with teratogenic agents during pregnancy, renal and vascular disease in pregnant women, mother anemia, placental or cord disorders, number of fetus, gestational diabetes, obesity in mother, diabetes mellitus, hydropes fetalis, history of genital infections, previous history of preterm labor, premature rupture of membranes.

After delivery, all needed information in subjects was gathered through the patient medical records and patients' history. Gestational age was calculated according to the first day of last menstruation period. Birth weight was evaluated by SECA standard scale. Hours of working during pregnancy, months of employment, carrying load, hours which mother had been sitting behind a computer or speaking to mobile phone and smoking history were measured and recorded in the checklist. After entering the data in SPSS-18 statistical software and measuring the central and distributive indices, *Chi*-square tests, *t* tests, ONE-way ANOVA and logistic regression were used for data analysis.

3. Results

In the present study, maternal mean age (± Standard Deviation) was 25.01 (± 4.8) years and the age range was 16-35 years. Among the studied pregnant women, 708 cases (55.6%) were working outside the house and 564 (44.4%) were housewives. The mean age in women who worked outside was (25.3 ± 4.5) years and this parameter in housewives was (24.7 ± 4.9) years. There was no significant statistical difference in maternal age between two groups (P>0.01).

Mean infants' birth weight was (2 884 ± 684) g and its range was 1 600 to 4 250 g; it was significantly higher in housekeepers (2 991±476 g) compared to employees (2 726± 457 g) (P=0.02).

Mean gestational age was (37.41± 2.40) weeks. It was (36.90 ± 2.40) in employees and (37.90± 2.30) in housekeepers (P=0.01). Gestational age less than 37 weeks was more seen in employees which was significant.

There was no significant relationship between birth weight and parity or maternal educations level although higher birth weight was seen in mothers with higher educational level (Table 1)

Smoking was few in our study and the relation between infants' birth weight and smoking was not significant (P value = 0.2) (Table 1).

The mean infants' birth weight among mothers who were farmer was less than other carriers; and in office workers (2 831± 526 g) were significantly higher than other carriers (2 651±384 g) (P<0.01) (Table 2).

Increasing the hours of working in a week resulted in decreasing the mean birth weight and it was significant (Table 3).

Table 1
Maternal demographic characteristics & birth weight.

Variable		Employees	Housekeepers	Birth weighrt[1]
Educational level	Diploma and under diploma	260(20.4%)	597(46.9%)	2 850±370
	Upper than diploma	304(23.9%)	111(8.7%)	2 887±442
Parity	0	117(9.2%)	39(3.1%)	2 942±563
	1-3	353(27.8%)	522(43.4%)	2 864±362
	≥4	94(7.4%)	117(9.2%)	2 863±791
Smoking	Smoker	27(2.1%)	3(0.2%)	2 761±476
	Non-smoker	525(41.7%)	706(56%)	2 876±489

[1]Data are presented as mean± standard deviation.

Table 2
Birth weight and gestational age of maternal occupational groups.

Variable	Number	Birth weight[1]	Gestational age[1]
Health care workers	154(27.3)	2 752±424	37.36±2.58
Retail workers	30(5.3)	2 686±440	37.2±1.9
Service worker	112(20.0)	2 570±295	36.8±1.2
Office worker	235(41.6)	2 831±526	37.37±2.6
Agricultural worker	33(5.8)	2 425±223	36.55±2.6

[1]Data are presented as mean ± standard deviation.

Regards to the months of employment during the pregnancy, those who were working less than 3 months showed a significantly higher mean birth weight. Also increase in hours of standing during a day resulted in decreasing the birth weight and the difference was significant.

Although mother's load lifting had no significant relation with birth weight, but data showed that this also could lead to low birth weight. There was no significant relation between working with computer and infants' low birth weight, but the mean birth weight in pregnant women who were working with computer more than 6 hours per day was lower than other employees.

Among women who were using cell phone more than others, the mean weight was lower but this relation was not statistically significant. Through using regression analysis, effect of gestational age on infants' weight was analyzed according to mothers' jobs. It was reported that in addition to gestational age and parity more than 4 mother's job was independently effective on birth weight and the probability of infant with less than 2 500 g birth weight or more than 2 500 grams was 2.4 in employees compared to housekeepers (Table 4).

Table 3
Maternal work related risk factors in neonatal low birth weight.

Variable		Weight		Total	*P*-value	*OR*	*CI* 95%(*OR*)
		<2 500	≥2 500				
Total working duration in pregnancy	<3 months	35(6.3%)	19(3.4%)	54(9.7%)	0.001	1.2	0.67-2.10
	≥3 months	300(54.3%)	198(35.9%)	498(90.3%)			
Working duration per week in pregnancy	<40 hours	278(50.0%)	11(20.0%)	389(70.0%)	0.001	1.8	1.20-2.70
	≥40 hours	96(17.3%)	71(12.8%)	167(30.0%)			
Standing duration per day in pregnancy	<7 hours	874(68.9%)	319(25.1%)	1193(93.9%)	0.001	2.4	1. 50-3.90
	≥7hours	41(3.2%)	37(2.9%)	78(6.1%)			

Table 4
Logistic regression of variables influencing birth weight.

Variable		OR(CI95%)	*P*-value
Maternal age	16-25	Ref	0.71
	26-35	0.96(0.53-1.53)	
Job	Housekeeper	Ref	0.001
	Employees	2.4(1.70-3.50)	
Gestational age	Term	Ref	0.001
	Preterm	3.4(2.50-4.70)	
Parity	0	Ref	0.84
	1-3	0.55(0.29-1.05)	0.001
	≥4	4.5(2.00-10.30)	
Education	≤diploma	Ref	0.65
	>diploma	1.2(0.50-2.90)	
Working hours per week	<40	Ref	0.56
	≥40	1.6(0.98-2.80)	
Working duration	<3 months	Ref	0.83
	≥3 months	0.91(0.37-2.20)	
Standing hours	<7 hours	Ref	0.98
	≥7 hours	1.008(1.16-3.55)	

4. Discussion

In this study, the infants' mean birth weight in employees was significantly lower than housewives. Niedhammer et al in 2009 studied 1 124 pregnant women and showed a significant relationship between physical labor and low birth weight [6]; in a similar study Vrijkotte *et al* studied 7 135 pregnant women and reported significant relation between labor severity and infants' low birth weight [7].

To evaluate the effect of labor or work type on birth weight, this study showed that farmer women had lower birth weight infants in comparison to others. In a similar study in 1999, Lima in Brazil on 958 pregnant women, had expressed the same results [8].

It could be concluded that low birth weight infants in employees could be result of higher activity and physical labor and its side effects on fetus.

This study also indicated that the mean birth weight of newborns had a significant relation with working hours per week and months during pregnancy; a study in 1988 by Mc Donald on 22 761 pregnant women, reported that working hours more than 46 hours per week could lead to low birth weight[9]. In another study in 1998, Tuntiseranee et al conducted studied 1 821 pregnant women and showed LBW had a significant relation with 51-60 hours work per week [10].

This study showed that long-term standing had a

significant relationship with LBW in infants but there was no significant relation between load lifting and infants' low birth weight. A study by Ha on 1 222 pregnant women also showed that long-standing (more than three hours a day) is significantly associated with low birth weight[11] and in Teiteman study in 1990, the mean birth weight was affected by long-standing, although there was no statistically significant relationship[12].

The relation between load lifting and LBW was significant in Tuntiserenee study which could be due to the higher sample size in that study or lack of proper reporting of load amount in our study[13].

There was a significant relation between mothers' job and preterm labor in our study. This results proved some similar studies, including Koemeester study in 1995 and Bonzini study in 2007 [14,15]. These studies also showed that physical activity and fatigue not only could affect the birth weight, but also it could lead to preterm labor.

In this study, the effect of mother job on low birth weight and preterm labor was evaluated simultaneously and it was showed that in employees the probability of both problems increased.

According to these findings, it could be concluded that lower working hours in a day and months of employment during pregnancy and avoidance of heavy working could result in decreasing these complications.

Conflict of interest statement

We declare that we have no conflict of interest.

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