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*Full Length Research Paper*

## Work Related Risk Factors and Pregnancy Outcome between Working Women

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**Background:** The employment rate of mothers has increased worldwide in recent years. So, there is concern about possible effects of work related risk factors and pregnancy outcome in working women.

**Objectives:** To identify the effect of work during pregnancy on pregnancy outcome.

**Subjects & methodology:** 500 pregnant women who were visiting the antenatal care clinic at Beni-Suef university hospital were our target group. They were interviewed using predesigned questionnaire, Physical activity questionnaire, Job Stress Questionnaire, Workplace Stress Survey and Body mass index (BMI). Statistical analysis performed using SPSS version 21.

**Results:** Perinatal death was significantly higher among working women (odds ratio = 1.9, CI= 1.1-3.8). Among studied working conditions, working more than 40 hours/ week was significantly associated with high rates of preterm delivery (Odds Ratio= 0.13, CI= 0.05-0.3) and small gestational age (SGA) was significantly increased with high work stress (P= 0.03).

**Conclusion:** Among the studied work conditions for working women working more than 40 hours/week, social stress index were found to be a significant risk factor for adverse pregnancy outcomes,. Other factors as shift work, work categories, and physical activity score showed no significant association with pregnancy outcomes. Therefore, as long as the health of the pregnant woman permits her to continue work during pregnancy that is not stressful or overloading for her, no adverse effect on pregnancy outcomes is expected.

**Keywords:** Pregnancy outcome, Shift work, small for gestational age, SGA, Perinatal death, preterm.

### INTRODUCTION

The potential impact of employment on pregnancy is an important issue due to the increasing number of woman entering the labor force and continuing employment throughout pregnancy. [1]

The majority of women remain well through their pregnancy. So, pregnancy should not be regarded as either an

illness, or a contraindication for work. However, a working pregnant woman may be exposed to particular hazards that might potentially cause adverse pregnancy outcomes for her or her fetus. [2]

A metanalysis has shown that physically demanding work that includes prolonged standing, shift and night work, and a

high cumulative work fatigue score may be associated with adverse pregnancy outcomes such as spontaneous abortion, stillbirth, or low birth weight. Occupational exposures may also, interact with the fetal development, resulting in health effects in the offspring, such as congenital malformations and neurobehavioral disorders in childhood. [3]

The significant work factors directly correlated with adverse pregnancy outcomes included: fewer household helpers, standing at work for more than 7 hours per day, working in hot environments, commuting, walking, and carrying and lifting heavy weights. [4]

The study of another systematic review reported moderate risks for working hours, shift work, lifting an object at work, and prolonged standing for pre-term delivery. [5]

Physical exertion has been suggested as a risk factor for adverse pregnancy outcome due to the combined effects of vasoconstriction, myometrial contraction, reduced plasma volume, and diversion of blood flow away from the placental bed, diminution of uteroplacental blood flow with resultant fetal hypoxia. This, along with possible hormonal imbalance, may have deleterious effects on the fetus. [4]

Despite the probability that working women may have less favorable pregnancy outcomes, some studies of the health among working women provide conflicting results and leave the issue unresolved. Moreover, only a few such studies have been conducted in the developing countries [1], which necessitates further study to clarify these issues.

## Aim of the work

To study the relation between works related risk factors and any adverse pregnancy outcome among a representative sample of pregnant women attending the antenatal care clinic at Beni-suef university hospital in Egypt.

## Subjects and methods

A prospective study involved 500 pregnant women who were visiting the antenatal care clinic at Beni-Suef University hospital, Egypt during the year 2013. The target group were enrolled in the study during their first antenatal care visit after taking their written consent to participate in the study. The purpose of the study was explained to all of them and all were followed up until delivery.

## Tools of study

### 1. Predesigned questionnaire:-

All participants were interviewed by trained personnel using a predefined questionnaire that included the following data:

- I. Personal information: - age at this first antenatal care visit, educational level, Special habits, contact information.
- II. Obstetric history: - duration of pregnancy at the first antenatal care visit, expected date of delivery, history of present and past conceptions if any. Number of children, history of abortion, stillbirth or low birth weight
- III. Occupational history: - for working participants, work characteristics were included in the details: -Type of work, number of working hours/ day, work pattern (daytime work or shift work), duration of work in years, working days/week, prolonged physical strain or fatigue, exposure to potential occupational hazards as radiation, chemical exposure, biological agents.

**Work categories:** -Type and nature of work were then categorized into 5 main groups (Clerical workers, Elementary occupations, Health Professionals, Teaching Professionals, Technicians) according to [6]

IV. Medical history: -History of Diabetes Mellitus, cardiac diseases, medications, etc. which may affect the outcome of pregnancy were excluded from the study.

V. Adverse pregnancy outcomes: -The main outcomes assessed during follow up included:

- i- Perinatal death (abortion, stillbirth or early neonatal deaths),
- ii- Preterm delivery (delivery of the fetus before 37 completed weeks of gestation),
- iii- Small for gestational age (SGA): - (birth weight below the 10th for a given gestational age). [7]

Pregnancy outcome was assessed during follow up of participating women in the sequential antenatal care visits (via ultrasound and other investigations) and after delivery. For women delivering outside the hospital, the outcome was obtained by contact information.

### 2. Physical activity questionnaire:-

General Practice Physical Activity Questionnaire (GPPAQ) was used as a validated short measure of physical activity based on the type and amount of physical activity involved during work. It generates a simple - 4-level Physical Activity Index (PAI) - categorizing subjects as: Active, Moderately Active, Moderately Inactive, and Inactive. [8]

### 3. The Job Stress Questionnaire:-

Load of stress encountered during work measured using. [9]

### 4. Workplace Stress Survey: -

AIS have created a job stress survey that can help reveal employee stress levels. Survey participants are asked to assign a number from 1 to 10 to 10 statements that describe the amount of work stress and work satisfaction.

According to this questionnaire, 3 levels of work stress were identified: -

- Mild stress (A score of 10-30)
- Moderate stress (A score of 40-60)
- Severe stress (A score of 70-100)

**5. Body mass index (BMI):** was calculated from the formula: pre- pregnancy weight in kilos/ (height in meter) <sup>2</sup>, then, according to [10] classification of BMI the women classified into 4 Categories underweight (BMI= 15-18.5), Normal weight (BMI= 18.5- 24.9), Overweight (BMI= 25-29.9), Obese (BMI= ≥ 30).

### Ethical consideration:-

To ensure privacy, dignity and integrity, the names of the participant were kept confidential.

### Data analysis:-

Data were tabulated and statistically analyzed using SPSS version 21, chi square test and Odds ratio were used to study the association between work related risk factors and studied

pregnancy outcomes. P value <0.05 was considered significant.

**Table1: - Relationship between working status and different pregnancy outcome**

Pregnancy outcome	Non-working women N= 326		Working women N= 174		Odds ratio	95%confidence interval	P value
	No.	%	No.	%			
<b>Perinatal death</b>	20	6.1	20	11.5	1.9	1.1-3.8	0.035
<b>Preterm delivery</b>	42	12.9	24	13.8	0.9	0.5- 1.6	0.7
<b>Small for gestational age (SGA)</b>	26	7.9	18	10.3	1.3	0.7-2.5	0.4

Working status was associated with a significant higher percent of perinatal death compared to non-working ones.

**Table2: - Relationship among different pregnancy outcomes and sociodemographic characteristics among working women**

Variable	Pregnancy Outcome						
	Perinatal Death N=20		Preterm Delivery N=24		SGA N=18		P
	No	%	No	%	No	%	
<b>Age categories</b>							
< 20 years	6	30	2	8.3	0	0	0.4
20 - 35 Years	2	10	5	20.8	14	77.8	0.3
>35 Years	12	60	17	70.8	4	22.2	0.1
<b>Residence</b>							
Rural	8	40	14	58.3	10	55.6	0.3
Urban	12	60	10	41.7	8	44.4	
<b>Educational level</b>							
Illiterate/ basic	6	30	8	33.3	10	55.6	0.02
Secondary/higher	14	70	16	66.7	8	44.4	
<b>BMI</b>							
Underweight	6	30	2	8.3	2	11.2	0.7
Normal	4	20	6	25	8	44.4	0.6
Overweight/Obese	10	50	16	66.7	8	44.4	0.3

This table shows: 1- Significant association between perinatal death, preterm delivery in one side and age category > 35 years on the other side.

2- SGA was significantly more prevalent among illiterate/ basic education group.

3- Preterm delivery was significantly more prevalent among overweight and obese women.

**Table 3: - Relationship between characteristics of work and different pregnancy outcomes in working women**

Pregnancy outcome	Work Shift				Odds ratio	95% confidence interval	P					95% confidence interval	P	
	Yes N= 24		No N= 150					<40 hours/ week N= 127	≥40 hours/ week N= 47		Odds ratio			
	No	%	No	%				No	%	No				%
Perinatal death	4	16.7	16	10.7	1.9	0.5 - 6.2	2	16	12.6	4	8.5	1.5	0.4 – 4.8	
Preterm delivery	5	20.8	19	12.7	1.8	0.6 – 5.4	3	8	6.3	16	34.1	0.13	0.05 – 0.3	
Small for gestational age (SGA)	4	16.7	18	12	2.2	0.7 – 7.3	2	12	9.4	6	12.8	0.7	0.25 – 2.1	

Preterm delivery was significantly higher in women working more than 40 hours/ week

**Table 4: - Relationship between type of job and different pregnancy outcomes among working women**

Pregnancy outcome	Type of job										P
	Clerical workers N= 40		Elementary occupations N= 40		Health Professionals N= 74		Teaching Professionals N= 14		Technicians N= 6		
	No.	%	No.	%	No.	%	No.	%	No	%	
Perinatal death	4	10	2	5	10	13.5	2	14.3	2	33.3	0.29
Preterm delivery	4	10	4	10	12	16.2	2	14.3	2	33.3	0.5
Small for gestational age (SGA)	4	10	6	15	8	10.8	0	0	0	0	0.5

No significant difference in the outcome of pregnancy in relation to the 5 job categories

**Table 5: - Relationship between both physical activity score and work stress index and different pregnancy outcomes among working women**

Pregnancy outcome	Physical activity scores				P							P
	Active N= 108		Inactive N= 66			Mild N= 34	Moderate N= 109		Severe N= 31			
	No.	%	No.	%		No.	%	No.	%	No.	%	
Perinatal death	16	14.8	4	6.1	0.18	3	8.8	16	14.7	1	3.2	0.18
Preterm delivery	14	12.9	10	15.2	0.5	31	9.2	91	83.5	28	90.3	0.4
Small for gestational age (SGA)	10	9.3	8	12.1	0.4	28	82.4	91	83.5	29	93.5	0.03

The prevalence of SGA was significantly higher among those with severe work stress

**Discussion**

This prospective study involved 500 pregnant women who attended the antenatal care clinic at Beni-Suef university hospital, Egypt during the year 2013. Of which, 174 women were working full time during pregnancy.

Perinatal death was reported in 11.5% vs. 6% for working compared to non-working subjects (p=0.035) (Table 1). This finding is consistent with that of [4] that found an increase in the perinatal mortality rate among employed women with reported significant work factors that correlated with miscarriage and/or perinatal death included: fewer household helpers, standing, working in hot environments, walking, carrying, and lifting heavy weight at work. [4] No significant difference was observed in preterm delivery and SGA between working and non-working women (Table 1); a finding which is similar to that reported [1] indicating that working to term in the

absence of contraindications did not impose any added risk to the mother or infant.

The risk of preterm delivery and perinatal death was significantly higher in the age group more than 35 years of age (Table 2), a finding that coincides with the study of [11], [12] who reported that older mothers are at increased risk of adverse pregnancy outcome compared to their younger counterparts.

Moreover, among working women, it was observed that the prevalence of SGA was significantly higher among women with low education (illiterate/ basic) (Table 2).

The relation between educational level and outcomes of pregnancy has been described many decades ago with the inverse relation between pregnancy outcomes and maternal education. Higher education not only presumes higher economic standing, but suggests a more informed approach to both self-care and the use of the health care system. Better

knowledge of health-related behaviors is also likely to be reflected by the woman's education level. [13]

In this study the preterm delivery was significantly higher in obese and overweight women, in agreement with that reported by [14] & [15] who found that maternal obesity carried significant risk for the mother and fetus.

Studying, working characteristics in relation to pregnancy outcomes, there was a significant higher prevalence of preterm delivery in women working more than 40 hours/ week during pregnancy (Table 3). This is similar to finding of other European studies that detect a moderate excess risk of preterm birth and small-for-gestational-age for pregnant women employed as manual workers and for those working > 40 hrs/ week, or standing for long periods. [16], [11], [3], [17], [18], [19], [20], [21]

There was no significant difference in pregnancy outcome in relation to shift work (Table 3), or different job categories (Table 4), which is in agreement with reported data from [16] & [22] indicating that work would not have a detrimental effect on pregnancy outcomes so long as pregnant women are in good health.

Small for gestational age is significantly high with severe work stress index (table 5); and this finding supported by [23]; A possible biological mechanism linking maternal stress and birth outcomes indicates that stress triggers the production of placental corticotrophin releasing hormone (CRH), which in turn results in reduced gestational age and low birth weight. [24] & [25]

## Conclusion

This prospective study was planned to demonstrate the relationship between different work characteristics and three of pregnancy outcomes, including perinatal death, preterm delivery, and small for gestational age. A Significant relationship was detected between working Status and perinatal death. Sociodemographic factors found to affect pregnancy outcomes, including older maternal age and low educational level, and high body mass index. Among the studied working conditions, working more than 40 hours/ week and work stress index were significantly associated with high rates of SGA.

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