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Occupational Predictors of Obstetric and Perinatal Outcomes in Working Women in a Health Care Facility: A Hospital-based Observational Study

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Abstract

Objective: To determine the effect and rate of adverse obstetrical and perinatal out-comes due to occupational factors and effects of sociodemographic factors, work characteristics, and type of occupation on obstetrical and perinatal outcomes in pregnant working women.

Study design: A Hospital-based observational study, conducted over one year and six months at a tertiary care center, AIIMS Rishikesh among pregnant women who were working at AIIMS Rishikesh.

Results: Out of 90 working women, 9 (10%) had an abortion, 7 (8.6%) developed anemia, 15 (18.5%) developed hypothyroidism, 15 (18.5%) had intrahepatic cholestasis of pregnancy (IHCP), 12 (14.8%) had pregnancy-induced hypertension (PIH), 9 (11.1%) had gestational diabetes Mellitus (GDM), 7 (8.6%) had intrauterine growth retardation (IUGR), 6 (7.4%) had oligohydramnios, 12 (14.8%) had a preterm birth (PTB), 16 (19.8%) had small for gestational age (SGA), 5 (6.2%) had antepar-tum hemorrhage (APH), 9 (11.1%) had premature rupture of membrane (PROM), 1 (1.2%) had a stillbirth and 17 (21%) had low birth weight (LBW). Elderly gravida, preobese/obese, urban, and stressed women were at high risk for PIH, FGR, SGA, and GDM.

Conclusion: In working women, adverse pregnancy outcomes such as abortion, PIH, GDM, PTB, SGA, etc. were reported. The main occupational predictors among health professionals for adverse pregnancy outcomes were advanced age, higher BMI, urban residency, upper or upper-middle socio-economic class, long working hours, shift duties including night, more physical activity, and moderate stress levels.

Keywords: Occupational Predictors; Obstetric and Perinatal Outcomes; Working Women.

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INTRODUCTION

In the modern era, the majority of women are involved in one or another profession and work throughout the pregnancy. Therefore, the working environment has an important role in pregnancy outcomes. The work and its related occupational factors need to be studied for maternal and fetal outcomes during pregnancy.[1] Most pregnancies remain unaffected and depend on the type of occupation. Pregnancy shouldn't be considered a disease or a reason to avoid working.[2] For high-risk occupations or medically complicated pregnancies, work accommodation may allow for continued safe employment.[3]

Adverse pregnancy outcomes are a significant public health problem that leads to serious short and long-term health consequences for the mother and the newborn baby.[4] Excessive physical exertion during pregnancy leads to the cumulative effect of vasoconstriction, myometrial contraction, reduced plasma volume, blood flow away from the placental bed, and decreased uteroplacental blood flow leading to fetal hypoxia.[5] Women who have more work-related stress, long working hours, night shifts, sleep deprivation, and not taking proper rest, can lead to excess release of catecholamines, and prolonged sympathetic response may lead to increased blood pressure.[6] Stress in pregnancy harms both maternal health and the development of the fetus. Therefore, assessing the stress levels of working pregnant women is crucial.[7]

We aimed to determine occupational factors' effect on obstetric and perinatal outcomes in pregnant working women in a health care facility.

MATERIAL AND METHODS

A hospital-based observational study was conducted over one year and six months (April 2021 - October 2022) at a tertiary care center in India, AIIMS Rishikesh after obtaining institutional ethical clearance (AIIMS/IEC/21/193). All eligible participants were enrolled in the study during their first antenatal visit, the sociodemographic factors such as age, body mass index (BMI), residence, socio-economic status, level of education, and work characteristics such as occupation (doctor, nursing officer, clerk, security guard, hospital attendant, or housekeeper) and type of employment (shift and day duties) were noted for all participants in patient's proforma.

All patients underwent routine antenatal workups including history, physical examination, investigation, and obstetric imaging. Physical activity (GPPAQ; General Practice Physical Activity Questionnaire)[8] and Work-related stress (WSSQ; Workplace Stress Survey Questionnaire)[9] were determined in all participants by using a self-filled questionnaire just before the termination of pregnancy. Patients were followed up until delivery and any adverse maternal and perinatal outcomes were noted.

Statistical analysis

The categorical variables were presented as numbers and percentages (%). Descriptive statistics were elaborated as means/standard deviations, medians/IQRs for continuous variables, and frequencies and percentages for categorical variables. We estimated the odds ratios (OR), relative risk (RR), and the 95% confidence intervals (95% CI) of the outcome variables and find the correlation between them. The data entry was done in the Microsoft EXCEL spreadsheet and the final analysis was done using Statistical Package for Social Sciences (SPSS) software, IBM manufacturer, Chicago, USA, version 21.0.

RESULTS

During the study period, 90 participants were recruited. Fig. 1 depicts the study's flow chart. Baseline characteristics are shown in Table 1, and work-related parameters are shown in Table 2. Rates of adverse obstetrical and perinatal outcomes were calculated. This study also evaluated the correlation of adverse outcomes with sociodemographic factors, physical activity, and work-related stress.

Table 1: Baseline characteristics of the study participants

Baseline characteristics	Mean ± SD / Frequency (n=90)	Percentage	95% CI (%)
Age (Years)	**29.68 ± 3.38**		
Age (Years)			
18-25	7	7.8	3.5 - 15.9
26-30	48	53.3	42.6 - 63.8
30-35	27	30.0	21.0 - 40.7

Table Cont...

>35	8	8.9	4.2 - 17.3
BMI (Kg/m²)			
<18.5	1	1.1	0.1 - 6.9
18.5-22.9	50	55.6	44.7 - 65.9
23.0-24.9	24	26.7	18.1 - 37.2
25.0-29.9	14	15.6	9.1 - 25.1
40.0-44.9	1	1.1	0.1 - 6.9
Residence			
Rural	13	14.4	8.2 - 23.8
Urban	77	85.6	76.2 - 91.8
Education			
High School	4	4.4	1.4 - 11.6
Senior High School	4	4.4	1.4 - 11.6
Graduate	52	57.8	46.9 - 68.0
Post-graduate	30	33.3	24.0 - 44.1
Occupation			
Doctor	23	25.6	17.2 - 36.0
Clerk	4	4.4	1.4 - 11.6
Guard	5	5.6	2.1 - 13.1
Housekeeper	2	2.2	0.4 - 8.6
Hospital Attendant	4	4.4	1.4 - 11.6
Nursing Officer	52	57.8	46.9 - 68.0
Type of Employment			
Contract	35	38.9	29.0 - 49.8
Permanent	55	61.1	50.2 - 71.0
Socio-Economic Status			
Upper	24	26.7	18.1 - 37.2
Upper Middle	52	57.8	46.9 - 68.0
Lower Middle	14	15.6	9.1 - 25.1

Table 2: Work-related parameters of participants

Work-related parameters	Mean ± SD	Frequency (n=90)	Percentage	95% CI (%)
Work Pattern				
Day Work		25	27.8	19.1 - 38.4
Shift Work		65	72.2	61.6 - 80.9
Working Hours/Week	45.53 ± 7.99			
Physical Activity				
Active		86	95.6	88.4 - 98.6
Inactive		4	4.4	1.4 - 11.6
Stress				
Mild		64	71.1	60.5 - 79.9
Moderate		26	28.9	20.1 - 39.5

Rate of adverse obstetrical and perinatal outcomes

Table 3 and 4 describe the rate of adverse obstetrical and perinatal outcomes. Out of 90 working pregnant women, the most common adverse outcomes were LBW and SGA. 21% of working women had LBW (95% Cl 13.0 - 31.) and SGA after 19.8% had (95% Cl 12.0 - 30.4). Most of the working women who had SGA were physically active, belonged to the > 35 years age group, were obese, belonged to urban areas, and had shift work duties. Working pregnant women who had LBW, belonged to urban areas, who did shift work duties and with obesity.

Table 3: Rate of adverse obstetrical outcome among study participants

Obstetrical Outcome	Frequency (n=90)	Percentage %	95% CI (%)
Abortion	9	10.0	5.0 - 18.6
PIH	12	14.8	8.2 - 24.8
New Onset Hypothyroidism	15	18.5	11.1 - 29.0
GDM	9	10.0	5.0 - 18.6
IHCP	15	18.5	11.1 - 29.0
Anemia	7	8.6	3.8 - 17.5
Oligohydramnios	6	7.4	3.0 - 16.0
IUGR	7	8.6	3.8 - 17.5
APH	5	6.2	2.3 - 14.4
PROM	9	10.0	5.0 - 18.6
Preterm birth	12	14.8	8.2 - 24.8
Still Birth	1	1.2	0.1 - 7.6
SGA	16	19.8	12.0 - 30.4
LBW	17	21	13.0 - 31.7

Abbreviations: **PIH** - Pregnancy induced hypertension, **GDM** - Gestational diabetes mellitus, **IHCP** - Intrahepatic cholestasis of pregnancy, **IUGR** - Intrauterine growth retardation, **APH** - Antepartum hemorrhage, **PROM** - Premature rupture of membrane, **SGA** - Small for gestation age, **LBW** - Low birth weight.

Table 4: Perinatal outcomes of study participants

Perinatal outcome			Mean+SD II Frequency (n=81)	Percentage	95%CI (%)
POG	Preterm		12	14.8	8.2 -24.8
	Term		63	77.7	–
	Postdated		6	7.4	–
Delivery	***Vaginal***	Spontaneous	24	29.6	30.1-52.2
		Induced	9	11.1	
	Cesarean	Elective	18	38.3	47.8-69.9
		Emergency	30	61.7	
Birth weight	LBW (<2.5 kg)		17	21	13.0-31.7
	Normal birth weight (>2.5 kg)		64	79	68.3-87.0
APGAR score	At 1 min		7.86 ±1.14	–	–
	At 5 min		8.83±1.06	–	–
NICU admission	Neonatal jaundice		12	14.8	8.2 - 24.8
	Respiratory distress syndrome		7	8.6	3.8 - 17.5
Hospital stay (days)			4.30±2.99	–	–

Correlation of adverse obstetrical and perinatal outcomes with sociodemographic factors and work-related parameters

Approximately 12% (9/77) of women belonged to the urban area [odd ratio- 3.74 (95% CI 0.21-68.26)]. And, 12.3% (8/65) did shift work duties women [odd ratio -3.37 (95%CI 0.4-28.43) & RR - 3.08 (95% CI 0.55-18.66)]. Hence, shift work and urban residency reported a statistically significant correlation with spontaneous abortion.

Women with PIH were 13% (5/39) of the 26-30 years age group women, 14.8% (4/27) in the 30-35 years age group, and 37.5% (3/8) in the > 35 years age group. While, 9% (4/44) of normal-weight women, 18.1% (4/22) among an overweight group, and 30.7% (4/13) in the preobese group had PIH. All of them (12/68; 17.6%) were from urban areas [odd ratio was 5.97 (95% CI 0.33-107.31)], suggesting higher chances of PIH in women in elderly gravida, raised BMI, and women belonging to urban areas.

Of women with GDM, 7% (3/44) normal-weight women, 13.6% (3/22) overweight, and 23% (3/13) preobese women developed GDM. All of them (9/68; 13.2%) were from urban areas, [odd ratio - 4.31(95% CI 0.24-78.7)], suggesting higher chances of GDM with higher BMI group and in women belonging to urban areas.

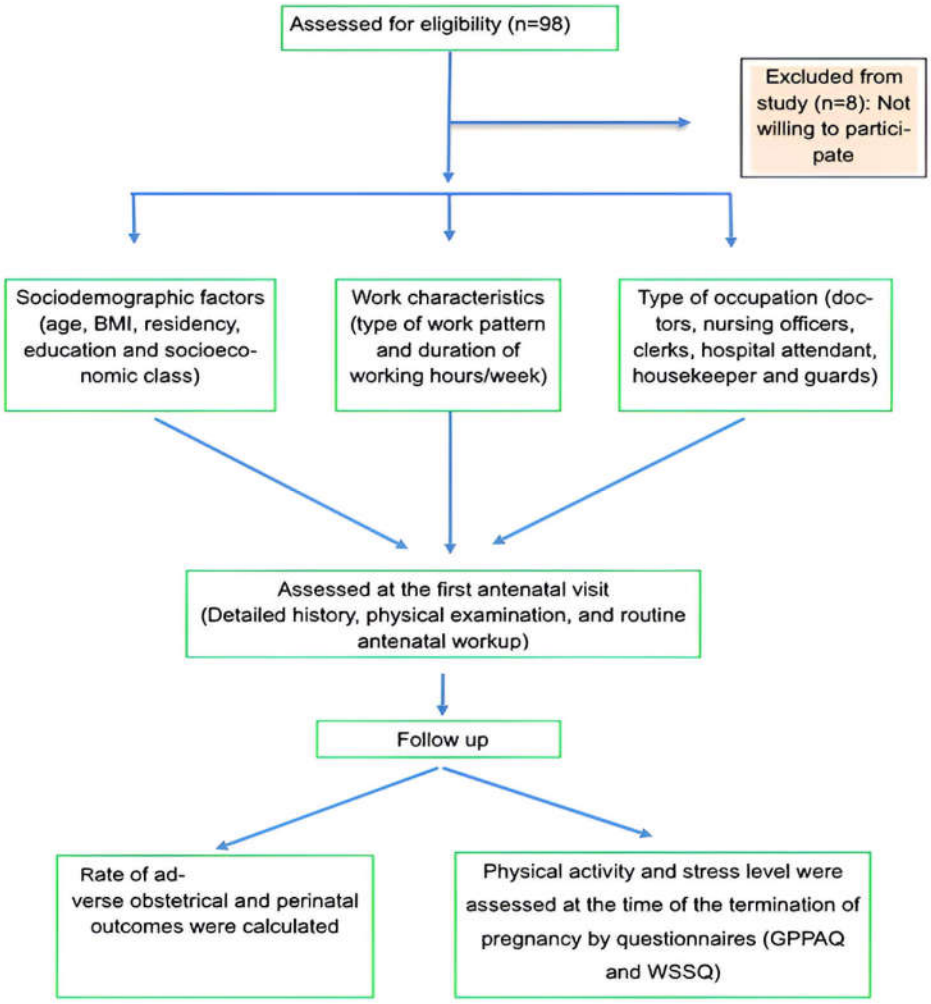

Fig. 1: Flow chart of the study

IHCP was noted in 22.7% (5/22) of doctors, and 22.7% (10/44) of nursing officers.

Most of them, (13; 19.1%) were from an urban area and (2/15.3%) were from a rural area [odd ratio - 1.3(95% CI 0.26-6.59) & RR-1.24 (95% CI 0.39-4.73)], suggests a higher chance of IHCP in women belonging to urban area.

Approximately 15.3% (2/13) anemic women were from rural areas, and 7.3% (5/68) were from urban areas, [odd ratio - 2.29 (95% CI 0.39-13.32) & RR -2.09 (95% CI 0.49-8.02)] suggest a higher chance of anemia in women coming from a rural area. There was no significant association between anemia and work pattern. Most of them (9/57; 15.7%) had PTB and did shift work duties, while (3/24;12.5%) participants did day work duties. A significant association was found between PTB and shift duties [odd ratio - 1.31 (CI 0.32-5.34) & RR -1.26 (CI 0.42-4.12)].

Oligohydramnios was noted (5/57; 8.7%) had shift work duties [odd ratio - 2.21 (CI 0.24-20.01) & RR -2.11 (CI 0.36-13.36)] and (1/24; 4.1%) had day work duties. Out of 6, (3/60; 5%), women had mild stress, and (3/21; 14.2%) had moderate stress [odd ratio - 3.17(CI 0.59-17.09) & RR -2.86 (CI 0.69-11.47)], hence significant association was found between oligohydramnios and shift work duties and moderate stress levels.

All of them (7/68;10.2%) were from urban areas [odd ratio- 3.29 (95 % CI 0.18-61.22)], suggesting a higher chance of IUGR in women belonging to urban areas. Out of 9 PROM patients, (5/60; 8.3%) had mild stress, and (4/21; 19%) had moderate stress, suggesting higher chances of PROM in moderate stress levels.

We report a statistically significant correlation between LBW and urban women [OR 3.69 (0.45-30.62 and RR 3.06 (0.65-17.73)], who did shift work duties [OR 1.48 (0.43-5.1) and RR 1.37 (0.54-3.76)] and with obesity [OR 2 (0.33-11.97) and RR 1.67 (0.46-4.25)]. We reported (37.5%; 3/8) of women had SGA, mostly in the > 35 years age group and approximately (23%; 3/13) in the obese group, (22%; 15/68) of women belonged to urban areas, [odd ratio -3.4 (95% CI 0.41-28.27), RR -2.87(95%CI 0.61-16.67)] and (21%; 12/57) had shift work duties [odd ratio -1.33 (95%CI 0.38-4.65), RR -1.26 (95%CI 0.49-3.51)], hence a significant association was found between SGA and women who belong to urban areas, elderly gravida, obese women and shift work duties.

DISCUSSION

Working pregnant women have a higher risk of adverse obstetric and perinatal outcomes. In our study, out of 90 women, 10% of working women had an abortion, 14.8% had PIH, 18.5% developed hypothyroidism, 11.1% had GDM, 18.5% had IHCP, 8.6% developed anemia, 14.8% had PTB, 8.6% had IUGR and 19.7% had SGA. Similar results were documented by Park C *et al*., a higher risk of abortion (19%), PTB (11.4%), and IUGR (1.6%) in working women.[10]

We reported a statistically significant correlation between spontaneous abortion and shift work duties and women belonging to the urban area in pregnant working women. Similarly, Bonde *et al.* estimated the increased risk for abortion with 5 occupation parameters including shift work, long working hours, lifting, standing, and physical workload.[11] Suzumori *et al.* also reported a significant association, who worked during pregnancy had significantly increased threatened miscarriage rate [odds ratios (OR): 1.47, 95% confidence interval (CI): 1.26-1.73)], compared to non-working women for the shifting duties and prolong working hours.[12] We did not find an association between abortion with advanced age, obesity, and socioeconomic status.

We reported a significant correlation between PIH and advanced age (37.5%), obesity (30.7%), urban residency (18%), and upper socioeconomic class (30%) pregnant working women and we did not find any significant correlation with shift work duties and a type of occupation. Spadarella *et al.* found a significantly increased risk of preeclampsia in working women (OR 2.3, 95% CI 1.2–4.6).[13]

Our study found a statistically significant correlation between GDM with elderly gravida (25%; 2/8), obese women (23%; 3/13), urban women (13.2%; 8/68) [odd ratio-4.31(95% CI 0.24-78.7)], with stress level (14.2%; 3/21) [odd ratio -1.5 (95% CI 0.34-6.62) & RR -1.43 (95% CI 0.41-4.66)], upper socioeconomic class (26%; 6/23) in pregnant working women and we did not find any significant correlation between GDM and type of occupation.

We reported a statistically significant correlation between SGA and elderly gravida, obese women, who belonged to urban areas [odd ratio -3.4 (95% CI 0.41-28.27), RR -2.87(95%CI 0.61-16.67)] and (21%; 12/57) and had shift work duties [odd ratio -1.33 (95%CI 0.38-4.65), RR -1.26 (95%CI 0.49-3.51)] in working pregnant women. Our study was supported by Bonzini *et al.* who found an association between shift work to four pregnancy outcomes: preterm delivery, LBW, SGA, and pre-eclampsia.[14]

Our study reported a statistically significant correlation between PTB and higher stress levels [odd ratio; 1.16 (95% CI 0.21-6.47), RR;1.14(95% CI 0.26-4.61)] and shift work duties [odd ratio; 1.31 (95% CI 0.32-5.34), RR;1.26 (95% CI 0.42-4.12)] in pregnant working women. On the contrary, Hathout HM *et al.* preterm delivery was significantly prevalent among obese women and prolonged working hours, and no significant difference in pregnancy outcomes with job categories.[2]

We reported a statistically significant correlation between SGA and physically active pregnant working women, [odd ratio - 2.41 (95%CI 0.12-47.15)]. This finding was supported by Lee LJ *et al.* who reported high levels of 'occupational physical activity was significantly associated with SGA [odd ratio -1.36; 95% CIs 1.02 to 1.82; p for trend=0.001].[15] We did not find any significant correlation between SGA and type of occupation and stress level. Unlike our study, Hathout HM *et al*. SGA was more prevalent among those with severe work stress.[2] On the contrary, Claudia A. Snijder *et al.* did not find any significant correlation between physically demanding work or working hours with SGA, LBW, or preterm delivery.[16]

The study was limited by being a single-centric study with, a small sample size, only employees of AIIMS Rishikesh were included and 8 women (who had abortions) declined to participate in the study. However, all the participants were followed throughout the pregnancy and the prospective nature of the study was the strength of the study. Multi-centric research with a pre-determined sample size with the inclusion of other job profiles and a comparison group of matched non-professional pregnant women is required to determine the causal association between work-related characteristics and adverse pregnancy outcomes.

CONCLUSION

In working women, adverse pregnancy outcomes such as abortion, PIH, GDM, PTB, SGA, etc. were reported. The main occupational predictors among health professionals for adverse pregnancy outcomes were advanced age, higher BMI, urban residency, upper or upper-middle socio-economic class, long working hours, shift duties including night, more physical activity, and moderate stress levels.

REFERENCES

1. Arafa M, Amine T, Abdel Fattah M. Association of Maternal Work with Adverse Perinatal Outcome. Canadian journal of public health. 2007; 98 (3): 217-21.
2. Hathout HM, Dalatony MM El, Anwar MM. Work-Related Risk Factors and Pregnancy Outcome between Working Women. Egyptian Journal of Occupational Medicine. 2015; 39 (2): 119-33.
3. ACOG Committee Opinion No. 733. Employment Considerations During Pregnancy and the Postpartum Period. Obstetrics & Gynecology. 2018; 131 (4): 115-123
4. Addisu D, Biru S, Mekie M. Predictors of adverse pregnancy outcome at Hospitals in South Gondar Zone, North-central Ethiopia. A multicenter facility-based unmatched case-control study. Heliyon. 2021; 7(2): e06323.
5. Wright EA. Low birth weight in the plateau region of Nigeria. East Afr Med J. 1990;67(12): 894-9.
6. Vrijkotte T, Van der wal MF, Van eijsden M, Bonsel GJ. First-trimester working conditions and birthweight. A prospective cohort study. Am J Public Health. 2009; 99(8):1409-16.
7. Knight-Agarwal, C R, Jani R, Foraih, M A. Maternal body mass index and country of birth in relation to the adverse outcomes of large for gestational age and gestational diabetes mellitus in a retrospective cohort of Australian pregnant women.BMC Pregnancy Childbirth. 2021; 21(1): 649
8. The General Practice Physical Activity Questionnaire (GPPAQ). Department of Health; 2006.
9. Workplace stress survey of The American Institute of Stress (AIS); 2011.
10. Park C, Kang Y, Kim D. Prevalence of abortion and adverse pregnancy outcomes among working women in Korea: A cross-sectional study. PLoS One. 2017;12(8): e0182341.
11. Bonde JP, Kristian Tore Jqrgensen, Matteo Bonzini. Risk of miscarriage and occupational activity: A systematic review and meta-analysis regarding shift work, working hours, lifting, standing and physical workload. Scand J Work Environ Health. 2013; 39(4): 325–34.
12. Suzumori N, Ebara T, Taro Matsuki T. Effects of long working hours and shift work during pregnancy on obstetric and perinatal outcomes: A large prospective cohort study. Japan Environment & Children's Study Group, Birth. 2020; 47(1):67-69.
13. Spadarella E, Leso V, Fontana L. Occupational Risk Factors and Hypertensive Disorders in Pregnancy: A Systematic Review. Int. J. Environ. Res. Public Health. 2021; 18(16); 8277
14. Bonzini M, Palmer K, Coggon D. Shift work and pregnancy outcomes: A systematic review with meta-analysis. BJOG: An International Journal of Obstetrics & Gynaecology. 2011; 118(12): 1429-37.
15. Laura J Lee, Elaine Symanski, Philip J Lupo. Role of maternal occupational physical activity and psychosocial stressors on adverse birth outcomes.Occup Environ Med 2017; 74(3):192–9.
16. Claudia A Snijder, Teus Brand,Vincent Jaddoe. Physically demanding work, fetal growth, and the risk of adverse birth outcomes. The Generation R Study. Occup Environ Med 2012; 69(8):543-50.