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Relationship Between Occupational Stress and Adverse Pregnancy Outcomes in Nurses

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ABSTRACT

Aims Pregnancy is a stressful process and nursing is also one of the most stressful jobs for women. The addition of occupational stress in women nurses can exacerbate pregnancy stress and affect pregnancy outcomes. Therefore, this study aimed to investigate the relationship between occupational stress and adverse consequences of pregnancy in nurses.
Instruments & Methods This descriptive cross-sectional study was carried out on the population of married women with a history of pregnancy in the nursing departments and operating rooms of medical education centers in Isfahan city, Iran, in 2018. Totally, 325 female nurses who had the experience of just one pregnancy while working in the nursing profession were selected using census method. Data collection tools were the OSIPOW occupational stress inventory and a reproductive health researcher-made questionnaires. The data were coded and analyzed using SPSS 16 software by Chi-Square, Kruskal-Wallis, and Mann-Whitney tests.
Findings The mean of occupational stress score was 160.0±19.5. There were no significant relationships between the mean of stress score of the subjects with the demographic parameters except the standard noise level in the workplace (p=0.004). There was a significant relationship between occupational stress and spontaneous abortion at 20-37 weeks (p=0.009).
Conclusion The level of stress in most of the nurses is moderate to severe and there are no relationships between the stress score and adverse pregnancy outcomes.

Keywords Nurses; Operating Rooms; Adverse Pregnancy Outcomes; Occupational Stress

CITATION LINKS

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Introduction

Today, with the advancement and development of society, the increased presence of women in the workforce has also exposed them to the risks posed by the work environment [1]. The living conditions of employed women in most parts of the world have not only reduced the responsibility of women but have also imposed double responsibility for them [2]. One of the most pressing jobs for women is nursing [3]. Over the past decade, nursing has consistently been at the highest level of occupational stress among all healthcare professions [4].

Occupational stress is the emotional and physical reaction caused by the interaction between the nurse and the work environment in which job demands exceed abilities and resources [5] and leads to negative health outcomes. According to the American Institute of Stress, 8 out of 10 occupational injuries, and 4 out of 10 employee relocations are mainly related to stress. The prevalence of occupational stress in nurses varies greatly, ranging from 9.2 to 68% [6]. In a study on 63 nurses in Tabriz teaching hospitals, occupational stress, and high anxiety were observed in 49.2% and 42.4% of nurses, respectively [7]. The results of a study in Ireland also showed high levels of occupational stress in Irish Nurses [8].

The interaction of several factors in the workplace causes occupational stress in nurses; the most important of which include excessive workload, the need for constant attention to the details of patient care, dealing with conditions of physical and emotional anxiety, insufficient autonomy to make decisions, and a low level of cooperation between patients and their relatives [9]. According to Doncourt's, 44.2% of nurses' stress sources in Ghana are related to high levels of workload [10]. Also, Wazqar *et al*. identified the workload rate of nurses as the main contributor to their occupational stress [11]. Job stress, in addition to reducing the quality of life and efficiency of nurses ' job performance, also leads to absence and loss of productivity [12]. The British Health and Safety Executive (HSE) estimated that work-related stress imposes 4.5 billion dollars in costs yearly on countries [13].

Work-related stresses and stressful work environments can adversely affect the state of mental and physical health, including the fertility of nurses [8]. For most women, pregnancy is very stressful, so that along with other stressors and events can be exacerbated and lead to adverse pregnancy consequences [14]. Evidence suggests a relationship between maternal stress and pregnancy outcomes [15, 16]. Stress in nurses can affect fertility, reproduction, and even breastfeeding [1, 17]. In this regard, Saurel-Cubizolles states that the occupational activity of nurses has a direct effect on the rate of preterm births [8]. Other consequences of pregnancy in nurses include fetal abnormalities and spontaneous abortion [19].

Various studies have examined the effect of chronic occupational stress status on fatigue, anxiety, depression, insomnia, burnout, and other mental health problems [20-23]. Quansah *et al*. studied the relationship between occupational risks of doctors and pregnancy outcomes, which showed a lack of relationship between occupational risks on birth weight loss, pre-term delivery, pregnancy weight, and perinatal death, but the risk of high birth weight and post-term delivery in doctors is lower than the reference group [24]. The results of the study by Cai *et al*. has shown the effect of work shift and working hours on pregnancy outcomes [25]. However, no study has investigated the relationship between occupational stress and adverse pregnancy outcomes in healthcare personnel, especially nurses. On the other hand, according to the research background, it seems that occupational hazards can have a negative effect on nurses' reproductive health. Therefore, this study aimed to determine the relationship between occupational stress and adverse pregnancy outcomes in nurses of Isfahan teaching hospitals.

Instrument and Methods

This descriptive cross-sectional study was carried out on the population of married women with a history of pregnancy in the nursing departments and operating rooms of medical education centers in Isfahan city, Iran, in 2018. Totally, 325 female nurses under 35 years old working at the hospitals of Isabn-e-Maryam, Imam Musa Kazim, Feiz, Kashani, Shahid Beheshti, Al-Zahra, Chamran, and Imam Hossein who had the experience of just one pregnancy while working in the nursing profession in the last 5 years to the time of the study were selected using census method. The nurses with multiple pregnancies, intervals of less than 18 months between pregnancies, intentional abortion in the last pregnancy, diseases related to preterm birth, chronic systemic diseases (e.g., high blood pressure), and a history of uterine diseases in the last pregnancy were not included. The criteria were verbally asked and recorded and if the person met the criteria for entering the study, they entered the research with informed consent. Twenty-five nurses were excluded due to the problems in the questionnaire.

Data collection tools were the OSIPOW occupational stress inventory and a reproductive health researcher-made questionnaires. OSIPOW has 3 parts; demographic characteristics (age, gender, education level, marital status, and pregnancy status), occupational information (occupation, job history, work hours, number of night shifts in a month), and the Occupational Stress Inventory-Revised (workload, work conflict, degree of control over the work environment, and participation in decision-making, management, the psychological atmosphere of the department, job promotion, job description, threat and violence, reward and

encouragement, equipment and facilities of the department, difficult conditions, etc.). The tool's reliability was reported 0.89 by Cronbach's alpha. The questionnaire was scored on a 5-item Likert scale (never, sometimes, often, usually, mostly) scored from 1 to 5. The score range of this questionnaire fluctuates between 60 and 300, and the higher scores indicate a high-stress level. Also, the level of overall stress was divided into four categories of low stress (50-90 points), low to moderate stress (149-100 points), moderate to severe stress (150-199 points), and severe stress (200-250 points) [26, 27].

A researcher-made questionnaire on reproductive health in nurses and operating room personnel were prepared in 3 main sections; the characteristics of pregnancies, employment status, and the outcome of the last pregnancy. It studied the employment status for each trimester of pregnancy; predominant shift work during the last pregnancy, average working hours per week, mobility or walking status during each shift, lifting 12kg or more frequently at work, and standard workplace noise, outcome of the last pregnancy as spontaneous abortion at less than 20 weeks, spontaneous abortion at 20-37 weeks, birth weight less than 2500g, congenital anomalies, intrauterine death after 20 weeks, preeclampsia, and gestational hypertension. The tool was validated through a survey of 10 faculty members specializing in nursing. The questionnaire reliability was checked using test-retest (r=0.8).

The researcher referred to the departments of the target hospitals after approving the project in Isfahan Nursing and Midwifery School, obtaining the code of ethics from the University Ethics Committee, and obtaining a recommendation letter from the research assistant of Isfahan Nursing and Midwifery School. The statistics of all female and married nurses were prepared by referring to the supervisors of the relevant departments. Then, using the staff's work schedule, the researcher visited the target hospitals and the people who were eligible for the study were selected as research subjects after obtaining informed consent. The questionnaires were provided to the subjects and were collected after filling out by them.

The data were coded and analyzed using SPSS 16 software by Chi-Square, Kruskal-Wallis, and Mann-Whitney tests that were used to analyze the relationship of stress and its various dimensions with adverse pregnancy outcomes.

Findings

The mean of the nurses' work experience was 7.52±5.05 years, work history during the last pregnancy was 10.42±3.86 years, age of the first pregnancy was 27.69±6.08 years, and age of the last pregnancy was 30.27±3.51 years.

The most type of employment was the contract type, the most shift work was fixed night shift, the predominant method of contraception was the natural method, and the average working hours was 44 hours (Table 1).

Table 1. Frequency of demographic characteristics of the subjects

Parameter	Number	Percentage
Employment type		
Planned	10	3.3
Contract	130	43.3
Agreement	67	22.3
Permanent	93	31.3
Occupation status		
Unemployed	12	4.0
Employment	171	57.0
Freelance	117	39.0
Dominant shift work during pregnancy		
Fixed morning shift	54	18.1
Fixed evening shift	54	18.1
Fixed night shift	6	2.0
Long shift	22	7.4
Rotating night shift	114	37.7
Rotating day shift	46	15.4
Morning & evening shift	3	1.0
Morning & long shift	1	0.3
Dominant method of contraception before the last pregnancy		
Contraceptive pills	23	7.5
Condom	108	36.0
IUD	7	2.7
Natural	155	51.5
other	2	0.7
Condom & IUD	1	0.3
Condom & natural	4	1.3
Average working hours per week (hour)		
<44	50	16.4
44	184	62.1
44<	66	21.5
The status of mobility or standing in each shift (hour)		
<3	25	8.3
3	82	27.3
3<	193	64.4
Standard noise level in the workplace		
Quiet	9	3.0
Semi-quiet	190	63.3
Almost constant noise	101	33.7
Monthly income level (Toman)		
1.5-2	93	31.0
2-2.5	166	55.3
2.5-3	37	12.3
3<	4	1.4

The mean of occupational stress score was 160.0±19.5. 71.3, 23.7, and 0.5% of the participants were in the range of moderate to severe, low to moderate, and low range, respectively. There were no significant relationships between the mean of stress score of the subjects with the demographic parameters except the standard noise level in the workplace (p=0.004; Table 2).

There was a significant relationship between occupational stress and spontaneous abortion at 20-37 weeks (p=0.009). However, there were no significant relationships between stress and outcomes; e.g., spontaneous abortion less than 20 weeks (p=0.57), birth weight less than 2500g (p=0.42), congenital anomalies (p=0.25), intrauterine death after 20 weeks (p=0.64), preeclampsia (p=0.73) and gestational hypertension (p=0.5; Table 3).

Table 2. Comparison of nurses' stress according to demographic parameters by Kruskal-Wallis test

Parameter	Stress score	p-Value
Employment type		
Planned	167.88±18.57	0.67
Contract	159.05±18.83	
Agreement	159.17±21.24	
Permanent	161.19±19.41	
Occupation status		
Unemployed	159.11±20.80	0.43
Employment	159.25±18.24	
Freelance	161.28±21.29	
Dominant shift work during pregnancy		
Fixed morning shift	161.50±22.43	0.36
Fixed evening shift	159.11±16.22	
Fixed night shift	166.79±16.22	
Long shift	152.89±15.29	
Rotating night shift	160.28±21.26	
Rotating day shift	160.31±14.89	
Morning & evening shift	152.67±8.95	
Morning & long shift	200.33±24.91	
Dominant method of contraception before the last pregnancy		
Contraceptive pills	159.52±16.56	0.57
Condom	162.22±19.32	
IUD	158.44±26.20	
Natural	158.40±19.96	
other	155.00±12.72	
Condom & IUD	172.00±18.03	
Condom & natural	160.03±19.57	
Average working hours per week (hour)		
<44	157.93±16.58	0.13
44	159.70±19.13	
44<	163.94±21.31	
The status of mobility or standing in each shift (hour)		
<3	154.99±19.71	0.3
3	158.77±13.78	
3<	161.22±21.46	
Standard noise level in the workplace		
Quiet	155.57±26.77	0.004
Semi-quiet	157.20±18.34	
Almost constant noise	165.76±19.96	
Monthly income level (Toman)		
1.5-2	159.45±21.66	0.59
2-2.5	161.29±18.28	
2.5-3	155.45±19.40	
3<	163.91±19.54	

Table 3. Comparison between occupational stress status and adverse pregnancy outcomes in nurses by Chi-square test

Adverse pregnancy outcomes		Stress status				p-Value
		Low	Medium	High	Total	
Spontaneous abortion before 20 weeks of pregnancy	Yes	6	17	2	25	0.769
	No	65	196	13	274	
Birth weight less than 2500 grams	Yes	6	31	0	37	0.131
	No	65	182	15	262	
Spontaneous abortion at 20-37 weeks	Yes	5	47	1	53	0.009
	No	66	167	14	247	
Congenital fetal and neonatal abnormalities	Yes	2	6	0	8	0.805
	No	69	208	15	292	
Intrauterine death after 20 weeks of pregnancy	Yes	0	4	0	4	0.443
	No	71	210	15	296	
Preeclampsia	Yes	1	10	1	12	0.412
	No	70	204	14	288	
Gestational hypertension	Yes	3	16	1	20	0.636
	No	68	198	14	280	

Discussion

Medical professions are stressful jobs and the stress can negatively affect the outcome of pregnancy among pregnant personnel [26]. Therefore, this study aimed to investigate the relationship between nurses' occupational stress and pregnancy outcomes. According to the findings, most of the subjects experienced the night shift work, however, there was no significant relationship between the rotating shift in the night with the unfavorable pregnancy outcomes. Since there was no increase in late preterm delivery (32-37 weeks) among rotating night shift work or fixed night shift work, night work may affect early pregnancy outcomes. The findings are in accordance with Suzumori *et al.* which showed a greater risk of adverse pregnancy outcomes in pregnant women who worked rotating shifts, fixed night shifts, or longer hours [27].

In this study, no significant relationship was observed between the increase in working hours per week (41 hours or more) and adverse pregnancy outcomes. Consistent with our results, Lawson *et al.* showed a 30% lower preterm birth in women who worked part-time (20 hours or less per week) during the first trimester than in women who worked 21-40 hours per week. However, there was no significant relationship between the increase in working hours per week (41 hours or more) and preterm birth. Although the working hour was statistically significant (p=0.01), there was no significant relationship between overtime work (41 hours or more per week) and the incidence of preterm birth [28]. However, Takeuchi showed that long working hours in the first trimester of pregnancy lead to miscarriage and preterm birth [29] which is not consistent with our findings. Van Beukering *et al.* studied Occupational hazards among female physicians and found that performing surgery in the absence of a proper ventilation system and long working hours causes preterm birth among female doctors [30]. The findings of this study showed that the majority of nurses are active for more than three hours per shift; however, there was no significant relationship between the activity level the pregnancy outcomes, which may affect daily rhythms and other hormonal mechanisms [31]. International Labor Organization (ILO) defined fatigue and lower limb problems due to standing for a long time, stress, and fatigue caused by work shifts and night shift work, and psychological and organizational stressors as conditions that endanger nurses' health. Exposure to some of these factors during pregnancy is associated with an increase in prenatal complications, including preterm birth. In addition, physical force and night shift work or irregular shift work are associated with spontaneous abortion and preterm birth in nurses [31,32]. The relationship between demographic and occupation characteristics with spontaneous abortion at 20-37 weeks of pregnancy showed that keeping other predictor variables constant, the probability of spontaneous abortion at 20-37 weeks decreased by 0.13 (95% CI 0.02-0.71) for standing for more than 3 hours per shift. In this study, the average occupational stress score in nurses was 160.0±19.5,

which based on the instructions of the OSIPOW questionnaire, the range of moderate to severe stress was observed in most of the subjects. Low to moderate, and severe stress were observed in 23.7% and 0.5 of the subjects, respectively. Job stress is caused by a perceived imbalance between workplace stressors and employee coping abilities; which leads to negative health outcomes [12]. Occupational stress is a mental, physical, or emotional pressure and occurs when there is a difference between the demands of the workplace and the individual's ability [33]. Stress is a well-known and common problem among nurses, and the most important factors causing it in nurses are low income, high work pressure, high overtime working hours, poor hospital infrastructure, and the need to constantly pay attention to the details of patient care [12]. In Faraji *et al.*'s study, 49.7% of nurses working in the ICU experienced moderate to high stress, and 25.22% experienced severe stress [8]. In accordance with our findings, Zhou *et al.* in China also found that most nurses have high stress [34].

The findings of this study showed no significant relationship between spontaneous abortion, birth weight less than 2500 grams, congenital abnormalities of the fetus, intrauterine death of the fetus, preeclampsia, and gestational hypertension with stress. whereas, there was a significant relationship between stress and spontaneous abortion at 20-37 weeks of pregnancy. Khalesi *et al.* showed that the change in pregnancy-specific anxiety is associated with preterm delivery in women [35]. Also, Wheeler *et al.* found no relationship between psychosocial stress measures with premature birth in primiparous women. However, some dimensions of psychosocial stress were related to premature birth in women with a history of term birth [31]. Vollebregt *et al.* found that occupational stress, anxiety, pregnancy-related anxiety, or depression does not affect the incidence of preeclampsia or gestational hypertension [36]. On the other hand, there is a possibility that the level of pregnancy complications in groups working in healthcare departments is lower than in the general society according to the knowledge of nurses and stress control methods, and the knowledge of pregnancy complications.

In accordance with the findings of this study, Khakbazan *et al.* found that the prevalence of preterm birth in the studied community was 17.2%. in the study by Khakbazan *et al.* the subjects with preterm delivery experienced unfavorable work situations such as working in the acute clinical department, standing for more than 3 hours, exerting physical force, excessively hot or cold weather conditions, restless environment with relatively constant noise, working hours more than or equal to 40 hours per week, and work fatigue score greater than or equal to 3 compared to the subjects with term delivery situation; however there was no significant relationship between the mentioned problems with preterm delivery [37]. The findings were not statistically significant, but they are clinically considerable. Therefore, based on the findings, nursing managers should identify and manage the factors that lead to occupational stress in nurses and implement the necessary executive actions to improve working conditions, reduce occupational stress, especially during the pregnancy of female nursing personnel, and eliminate or reduce pregnancy complications in nurses.

The limitations of the study were its conducting in teaching hospitals, the lack of participation of non-academic hospital personnel, the low birth rate especially among health professionals during the years of conducting the research, the small number of samples, and differences in diagnostic methods of preterm labor and the need to refer to memory to answer questionnaire questions. Therefore, it is suggested to conduct a comprehensive study that includes all the factors affecting stress and the outcome of pregnancy with a higher statistical population at a wider level.

Conclusion

The level of stress in most of the nurses is moderate to severe and there are no relationships between the stress score and adverse pregnancy outcomes.

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