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Association Between Occupational, Pregnancy Hazards, Psychosocial Factors, and Preterm Birth

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Abstract:
Background*: Preterm labor (PTL) is a leading cause of neonatal and infant mortality as well as short- and long- term disability. The* ***aim*** *of this study is to; determine the association between occupational, pregnancy hazards, psychosocial factors and preterm birth. A case-control* ***design*** *was selected in carrying out this study and a representative* ***sample*** *of 300 parturient women (150 with preterm labor and 150 with term labor) were recruited for this study.* ***The tool*** *used for data collection was; a structured interview sheet to collect data about age, name, education, occupation, pregnancy hazards, psychosocial factors associated with preterm birth.* ***The results*** *of the present study revealed that, the risk of having preterm labor was significantly increased with increased weekly working hours (43 hours and more/w), rising standing hours (more than 6 hours/d) and carrying heavy loads (more than 20 kg). Also PTL women were more likely to have stress, low social support, more exposed to pregnancy hazards, and unsafe environment.* ***It can be concluded that;*** *preterm birth was significantly associated with bad occupational factors, low psychosocial support, excessive exposing to pregnancy hazards, and unsafe environment.* ***The study recommended that;*** *performing programs, like increased prenatal visit, patients education, home visits, nutritional counseling, social and psychological support and identifying and treating maternal illnesses and antenatal complications are essential to avoid preterm birth.*
Keywords: *Preterm birth, risk factors, occupation, pregnancy hazards, psychosocial factors.*

I. Introduction:

Preterm birth (PTB) complicates 5 to 7% of births in developed countries and is estimated to be even more prevalent in developing countries.(1) PTB is the leading contributor to infant morbidity and mortality, accounting for 42% of neonatal death in the Americas alone.(2) Furthermore, infants born preterm are at increased risks of enduring adverse health squeal including cerebral palsy, blindness, cognitive, sensory, learning, and language deficits.(3)

Although the precise etiology of PTB remains elusive, low socioeconomic status, psychosocial stress, exposure to environmental toxins have been identified as PTB risk factors.(4)

Broad range of studies have found that certain working conditions, in particular physically strenuous or fatiguing work, increase the risk of preterm birth. (6 &7) Identifying employment related risk factors for preterm delivery is of particular importance because these risks are amenable to change through policies granting work leaves or modifying working conditions during pregnancy. In contrast, most other risk factors for preterm birth cannot easily be changed.

Studies of working conditions and pregnancy outcomes have not always identified the same working conditions as high risk and some studies have found no relation with preterm birth.(9) The variability in study results could be attributable to the use of different measures of working conditions, different methods of collecting data on exposure (prospectively or retrospectively), or the choice of socio-demographic control variables. Adjusting for socio-demographic characteristics affects measures of risk levels considerably, as occupational category is highly related to social characteristics.

Increasingly, maternal psychiatric symptoms, particularly symptoms and or diagnoses of mood and anxiety disorders have been implicated as important PTB risk factors.[7&13] Despite these methodological limitations, results from recent literature reviews indicate that maternal psychiatric disorders, particularly mood disorders, are important risk factors of PTB.[9&13] Given this gap in the literature, the researcher hypothesized that maternal depressive, anxiety and stress symptoms during pregnancy as well as occupational hazards are associated with increased PTB risks among women in Zagazig City.

Significance of the study*:*

Although many studies exposed to how obstetric and medical risk play a role in the occurrence of preterm labor, but it is less clear how the risk of occupational, pregnancy hazards, and psychosocial factors varies between preterm and term labor. Therefore, the present study is conducted to determine the association between occupational, pregnancy hazards, psychosocial factors and preterm birth, in the Maternity and Childhood Hospital at Zagazig University Hospitals.

Aim of the study:

- Determine the association between occupational, pregnancy hazards, psychosocial factors, and preterm birth.

Research question:

- What is the association between occupational, pregnancy hazards, psychosocial factors, and preterm birth.

Subjects and methods:

Research design:

A case-control design was adopted in this study to determine the effect of modifiable risk factors associated with preterm birth.

Setting:

The present study was conducted from the labor unit in the Maternity and Childhood Hospital at Zagazig University Hospitals. This hospital was selected because it is a teaching hospital and the delivery turnover is satisfactory for the study.

Subjects:

The sample size was estimated according to **[19]** using a power of 80% , with odds ratio (OR) worth detection = 2.0, and Alpha error = 0.05. Thus the total sample size was 300 parturient women. The study subjects were randomly divided into two equal groups of 150 parturient as follows:

- ***Case group***: women with preterm labor group, 28 to 36 wks$^{+6 \text{ days}}$ (n=150).
- ***Control group***: women with term labor group, 37 to 41 wks$^{+6 \text{ days}}$ (n=150).

Inclusion criteria:

1. Parturient women diagnosed with PTL (for the case group) whether spontaneous or induced (indicated, iatrogenic).
2. Parturient women diagnosed with term labor (for the control group) whether spontaneous or induced.
3. No intra uterine fetal death (IUFD).
4. No threatened preterm labor i.e. patients who respond to medical management and discharged from the hospital.

Tool of data collection:

A structured interview sheet

The questionnaire was designed to collect data from parturient women in both groups regarding to:

- **Socio-demographic data such as:** age, education, residency and family income.
- **Current pregnancy data** which included data about hospital admission, causes of hospitalization during pregnancy, associated problems encountered on admission to labor room and perceived social support, stress, pregnancy hazards and occupational factors.

Perceived social support is measured by using Multidimensional Scale of Perceived Social Support

(MSPSS). This was developed by ***Zimet et al.,*** **(33)** as a 12-item scale that measures perceived social support in three domains of family, friends and significant others. The original English version of the **MSPSS** had a 7 point Likert scale that ranged from very strongly disagree to very strongly agree. These appeared too many and would be difficult to illiterate women so during adaptation of this scale, the parturient women in both groups were asked to indicate their agreement with items on a 3-point Likert-type scale, ranging from disagree to agree.

Visual illustrations of facial expression depicting agreeableness to proposed responses on the MSPSS **(22)** was modified by the researcher and presented as only 3 figures. Scores less than 24 indicate low social support and scores more than or equal 24 indicate high social support.

Stress is measured by using Standard Depression Anxiety Stress Scale-21 ***(DASS-21)*** scale. This scale was developed by ***Lovibond and Lovibond.*** **(15)** This scale includes 21 items, with 7 items for each domain of depression, anxiety, and stress. In this study, the researcher measured only 7 items of stress. The stress scale assessed difficulty relaxing, nervous arousal and being upset or agitated, irritable or over-reactive and impatience. The parturient women in both groups were asked to indicate their agreement with items in rating scale from never (0) to almost always (3) by using 5-point severity/frequency scales to rate the extent to which they have experienced each state over the past week. The final score of each item groups (Depression, Anxiety and Stress) needed to be multiplied by two (x2) because the **DASS-21** is a short form version of the DASS (the Long Form has 42 items).

Level of stress	**Range of score**
Normal	0-7 (0 - 14)
Mild	8-9 (15-18)
Moderate	10-12 (19-25)
Sever	13-16 (26-33)
Extremely sever	17+ (34+)

Concerning the variables describing occupational factors, these were selected from the International Standard Classification of Occupations (ISCO-88). It was classified as; weekly working hours, standing position, carrying heavy loads.**(12)**

Regarding the pregnancy hazards; women were asked about

- Contact with ionizing radiation
- Contact with suspected mutagenic chemicals
- Contact with paints or heavy metals
- Exposure to pollution from air, water, food
- Exposure to passive smoking

The total score is 100 each one is given a grade of 20.

Administrative design:

An official permission was granted by submission of an official letter from the Faculty of Nursing to the responsible authorities of the study setting to obtain their permission for data collection.

Ethical consideration:

All ethical issues were taken into consideration during all phases of the study: the researcher maintained an anonymity and confidentiality of the subjects. The inclusion in the study was totally voluntary.

The aim of the study was explained to every woman before participation and a verbal agreement was obtained. Women were notified that they can withdraw at any time they need, and the information obtained during the study will be confidential and used for the research purpose only.

Preparatory phase:

During this phase, the researcher reviewed local and international literature to obtain more knowledge about the study. This also helped in designing the study tool. The tool was tested for content validity by five experts in the field of obstetrics and gynecological nursing. Cronbach's Alpha test was used to test the study tools' reliability. The corresponding Cronbach's Alpha values for the subscales were 0.849, 0.892 and 0.864 for family, friends and significant other respectively and it was 0.942 for stress scale (from DASS21). The recommended modifications were done and the final form was ready for use.

Pilot study:

A pilot study was carried out on 30 parturient women (who were excluded from the sample) to assess the clarity and applicability of the data collection tool, arrangements of items, estimate the time needed for the sheet and the feasibility of the study and acceptance to be involved in the study. Necessary modifications were

undertaken.

Field study:

Collection of data covered a period of six months "from the first of June 2014 to the end of November 2014". After getting the official permission, the pilot testing of the study tool was done and analyzed. The researcher interviewed the parturient women and explained the purpose of the study and obtained their verbal agreement.

II. Statistical design:

After the collection of data, it was revised, coded and fed to statistical software SPSS version 20. The given graphs were constructed using Microsoft excel software. All statistical analysis was done using alpha error of 0.05. P value less than or equal to 0.05 was considered to be statistically significant.

III. Results:

Table (1): indicates that more women in the case group reported having increased weekly working hours (43 hours and more), rising standing hours (more than 6 hours) and carrying heavy loads (more than 20 kg) compared to the control group (29.3%, 23.3%, 7.3% vs. 7.3%, 6.7%, 0.7 %respectively). Differences observed are statistically significant (0.001, 0.001 and 0.006)**.**

Concerning pregnancy hazards, **table 2** points to statistical significance between parturient women in the two study groups. Almost three fourth of the case group (74.7%) were significantly (p=0.001) exposed to pregnancy hazards compared to less than half (46.0%) of the control group.

In total **figure (1)** demonstrates that unsafe environment make women more vulnerable to preterm labor. Almost two fifths (40.7%) of women in the case group were exposed to unsafe environment compared to only (20.7%) of the control group. Difference observed is statistically significant (0.001).

Table (3): points to statistically significant differences between women in the case and control groups regarding perceived social support (P=0.001). It is clear that three fifth of women (60.0%) in the case group received low social support compared to the control group (14.0%).

Table (4): describes stress factor among parturient women in the two study groups. Women in the case group experience severe and extremely severe stress compared to the control group (59.4% vs. 12.0% respectively), (p=0.001).

IV. Discussion:

Increased working hours, rising standing hours and carrying heavy loads were significantly identified as risk factors for PTL. In the present analyses, the excess risk associated with working hours was only observed for working weeks over 42 hours. ***Kiran et al.,*** [13] study in India about the predictive value of various risk factors for preterm labor found that involvement in heavy work requiring prolonged standing accounted for 40% of the preterm labor. In addition, ***Alijahan et al.,*** [1] reported that an odd of delivering a preterm birth was significantly high among women involved in heavy physical works.

Metti et al., [13] interpret such finding by the fact that, during exercise, both adrenaline and nor adrenaline levels rise, and since nor adrenaline affects the uterus; exercise could theoretically induce preterm birth via uterine contraction.

The relationship of cigarette smoking to preterm birth is somewhat modest and not completely replicable. [5] Its influence on pregnancy outcomes, like preterm birth, is most notable in the third trimester and there is no increased risk detected in mothers who smoke prior to the onset, or in the early stages of pregnancy.[5] The current finding shows that almost three fourth of preterm labor women were significantly exposed to passive smoking compared to less than half of the control group (p=0.001). This is in agreement with ***Tepper,*** [30] who reported that passive smoking contributed to preterm labor. However, some studies found no significant correlations between preterm labor and smoking. [1,28]

El-sayed et al., [8] interpret the above finding by the fact that smoking increases the secretion of the enzyme platelet activating factor and acetyl hydrolase 20, which are pro-inflammatory mediators found in amniotic fluid of women with PTL and PPROM. This has been shown to stimulate production of prostaglandin E2 in fetal membranes and to cause contraction in myometrial tissues.

The results of studies on psychosocial stress and preterm labor are inconclusive; most of them have reported a significant link as in this study, where significant association is observed between preterm birth and women who experience more severe and extremely severe stress. [3, 11, 27] A possible explanation of this correlation between premature delivery and mother's mental health status (level of stress, anxiety, depression) was made by ***Graignic-philippe and Tordjman,*** [10]. They mentioned that as the result of the release of catecholamines and therefore reduction of placenta blood circulation, oxygen and nutrients in the fetus lead to disorders in fetal growth and premature labor. Given that stress increases corticotrophin-releasing hormone,

cortisol, and plasma levels, it may contribute to an increase in uterine contractions and consequently premature labor.[7]

In the same context there are a lot of studies on the direct and indirect role of perceived social support on reducing stress and improving mental status of individuals. It is believed that social support can directly increase self-esteem, boost resistance against infections, and help behave in a healthy manner. It can also indirectly cause social adjustment and balance individual's response to stressors and reduce stress, which in turn causes physical and mental health. [14,32, 24, 18] This corresponds well with the finding of the present study which revealed that women who had PTL were significantly more likely to have low social support.

V. Conclusion:

The risk of having preterm birth was significantly increased with the bad occupational factors, excessive exposure to pregnancy hazards, low social support, and stress.

VI. Recommendations:

- The nurse should discuss with vulnerable women preterm labor signs and symptoms, risk factors, consequences of environmental hazards during pregnancy, provide counseling and intervention whenever needed beyond simply giving pregnant women a handout or a pamphlet.
- The maternity nurse should focus on reducing modifiable risk factors, such as the psychosocial risk factors together with medical factors that are associated with PTL e.g. infection, PIH, abortion.

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Table 1: Distribution of the Studied Women According to Occupational Factors & Preterm Birth (n=300):

Occupational Factors	Groups				X^2 (P)
	Cases (PTL) (n=150)		Controls (Term labor) (n=150)		
	No	%	No	%	
Weekly working hours					
less than 30	52	34.7	74	49.3	24.8 (0.001)*
30-39	30	20.0	39	26.0	
40-42	24	16.0	26	17.3	
43 or more	44	29.3	11	7.3	
Standing position					
Less than 2h	64	42.7	89	59.3	17.9 (0.001)*
2-6h	51	34.0	51	34.0	
More than 6h	35	23.3	10	6.7	
Loads heavy					
No	77	51.3	67	44.7	12.3 (0.006)*
5-10kg	51	34.0	71	47.3	
More than10 - 20 kg	11	7.3	11	7.3	
More than 20 kg	11	7.3	1	0.7	

!: P value based on Fisher exact probability * P < 0.05 (significant)

Table 2: Distribution of the Studied Women According to Exposure to Pregnancy Hazards & Preterm Birth (n=300):

Pregnancy Hazards	Groups				X^2 (P)
	Cases (PTL) (n=150)		Controls (Term labor) (n=150)		
	No	%	No	%	
Contact with ionizing radiation					
Contact with suspected mutagenic chemicals					
Contact with paints or heavy metals					
Exposure to pollution from air, water, food					

Exposure to passive smoking					
No	38	25.3	81	54.0	25.7 (0.001)*
Yes	112	74.7	69	46.0	

!: P value based on Fisher exact probability * P < 0.05 (significant)

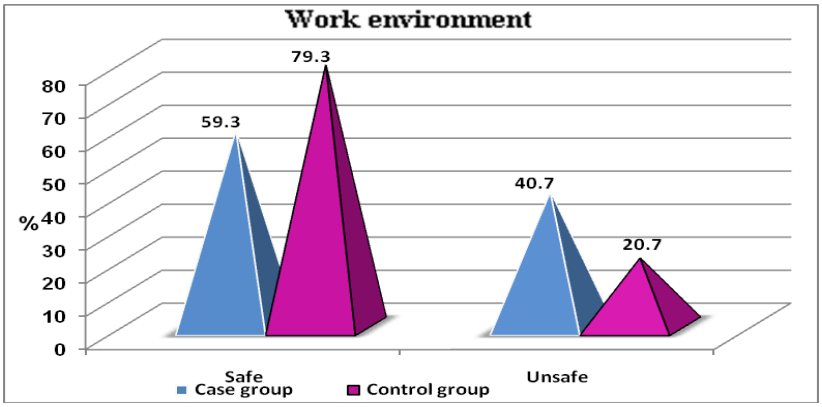

Figure (1): Distribution of Studied Women According to the Safety of the Working Environment & Preterm Birth (n=300)

Table 3: Distribution of the Studied Women According to Social Support & Preterm Birth (n=300)

Perceived social support	**Groups**				X^2 **(P)**
	Cases (PTL) (n=150)		**Controls (Term labor) (n=150)**		
	No.	**%**	**No.**	**%**	
Perceived social support					
Low social support	90	60.0	21	14.0	0.001*
High social support	60	40.0	129	86.0	

MCP: P value based on Mont Carlo exact probability * P < 0.05 (significant)

Table 4: Distribution of the Studied Women According to Stress Factor & Preterm Birth (n=300):

Stress factor	**Groups**				X^2 **(P)**
	Cases (PTL) (n=150)		**Controls (Term labor) (n=150)**		
	No.	**%**	**No.**	**%**	
Stress					
Normal	27	18.0	95	63.3	
Mild	7	4.7	15	10.0	
Moderate	27	18.0	22	14.7	69.4 (0.001)*
Sever	46	30.7	14	9.3	
Extremely sever	43	28.7	4	2.7	

MCP: P value based on Mont Carlo exact probability * P < 0.05 (significant)

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