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Occupational Stress and Physical Activity Practices among Pregnant Women in A South-Eastern Nigerian City: Exploring Possible Associations

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ABSTRACT

INTRODUCTION: Occupational stress (OS) is a significant concern for pregnant women who remain employed during pregnancy. The relationship between OS and Physical Activity (PA) among pregnant women remains poorly understood. By investigating this relationship, we can better understand how OS may impact PA levels during pregnancy and vice versa with identification of potential strategies to promote healthy lifestyle habits among working pregnant women. This study explored the relationship between occupational stress and physical activity among pregnant women in the Enugu metropolis.

METHODS: A cross-sectional descriptive survey involving 146 pregnant women recruited from five public hospitals in Enugu, Nigeria. The brief job stress questionnaire and pregnancy physical activity questionnaire were used to assess respondents' OS profiles and PA, respectively. Data were analysed with descriptive statistics, Chi-square, and Spearman's rank correlation at $P < 0.05$.

RESULTS: A low risk of OS was observed with most of the participants across OS domains. The major sources of participants' OS were time pressures (8.2 ± 3.3) and pressure on the job (7.6 ± 3.0), with time pressures ranking higher. Most of the participants were moderately active. A significant relationship was observed between respondents' total OS and each of their occupation-related PA ($r = 0.273$, $p = 0.001$) and total PA ($r = 0.226$, $p = 0.006$) practices.

CONCLUSION: The majority of participants experienced low OS. However, higher cumulative stress was associated with increased PA, possibly suggesting physically demanding nature of their jobs. Interventions promoting safe PA during pregnancy, and workplace policies addressing job stressors are recommended.

Keywords: Occupational stress, Physical activity, Pregnancy, Nigeria

INTRODUCTION

Pregnancy represents a biologically and emotionally demanding period, thus increasing the susceptibility of pregnant women to various forms of stress, which can significantly impact both maternal and fetal health [1]. Stress has been recognized as a critical factor in the development

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of physical and emotional health issues during pregnancy [2]. It is associated with an increased risk of antenatal/postpartum depression or anxiety symptoms, hypertension and pre-eclampsia [3]. Through mechanisms such as the transfer of stress hormones across the placenta, elevated maternal stress can also negatively impact the developing fetus [4]. High levels of stress during pregnancy have been linked to adverse outcomes for the child, including preterm birth, low birth weight, cognitive impairments and socio-emotional difficulties [5,4,6]. Among common sources of stress for pregnant women are occupational factors such as excessive workload and long working hour [7,8]. Pregnant women, especially those who are employed, are at higher risk of occupational stress due to physical, psychological, and social adjustments [3].

Occupational stress is a significant concern for pregnant women who remain employed during pregnancy, particularly when their work involves long hours, physical exertion, limited flexibility, job insecurity, and insufficient workplace support [3,9,7]. In many settings, workplace accommodations are limited, increasing the burden and risk of mental and physical stress [10]. In Nigerian female populations, occupational stress is associated with increased workload, family size, and job demands [11,12] and elevates risks for hypertension, cardiovascular disease, muscle pain, chronic fatigue, and psychological distress [13]. In Enugu, Nigeria, occupation has been linked with increased risk of musculoskeletal disorders among pregnant women [14]. This highlights the importance of effective stress management strategies. Engaging in physical activity both before and during pregnancy has proven beneficial in mitigating the adverse effects of occupational stress [15].

Physical activity has been shown to reduce perceived stress, enhance mood, and improve sleep and physical well-being [16,17]. Among pregnant women, it is associated with better cardiovascular health, weight control, reduced risk of gestational diabetes, and improved psychological resilience [18-21]. Other established benefits include reducing pain during pregnancy, positively influencing labour outcomes and enhancing fetal well-being [22,23]. The World Health Organisation recommends at least 150 minutes of moderate-intensity aerobic activity weekly during pregnancy, due to documented benefits [24]. A Pregnancy Cohort Study conducted in Ibadan, Nigeria, reveals that none of the participants met the WHO target [25].

In many low-and middle-income countries, including Nigeria, there is limited research specifically linking physical activity levels to occupational stress among pregnant women. This represents a significant gap, especially considering the rising rates of maternal morbidity related to stress and sedentary lifestyles [13,26]. Although both occupational stress [27,28,14] and physical activity [25,29,30] have been researched in Nigeria, the intersection of these factors among pregnant women remains understudied.

METHODS

Study Design

This study utilized a cross-sectional descriptive survey design to explore the association between occupational stress and physical activity levels of pregnant women. The study was reported following Strengthening the Reporting of Observational studies in Epidemiology (STROBE) guidelines. The study was conducted in five hospitals in Enugu metropolis, South-eastern Nigeria. A convenience sampling technique was utilized to recruit pregnant respondents attending antenatal classes in the selected hospitals. Pregnant women who cannot communicate in either the English language or the native Igbo language, those with neurological conditions, hearing loss, and memory deficits that may impair recall were all excluded from the study. A preliminary power analysis showed that a sample of 120 participants will be needed for the Chi-square analysis at a degree of freedom (df) = 1, to achieve 99% (0.99) power with a small to moderate effect size of 0.40 at an alpha level of 0.05 [31]. However, 146 respondents were included in this study to control for attrition.

Instruments for Data Collection

A self-structured questionnaire was used to assess the respondents' socio-demographic, maternal and occupational characteristics. Their physical activity level and occupational stress were measured using the Pregnancy Physical Activity Questionnaire (PPAQ) and the Work Stressor Questionnaire, respectively. The questionnaires were self-administered and clarifications were provided where necessary.

Pregnancy Physical Activity Questionnaire (PPAQ): The PPAQ is a self-administered tool specifically designed to evaluate and quantify physical activity (PA) levels among pregnant women. It measures the frequency and duration of various types of activities and assigns an intensity value to each activity. Respondents are asked to report the time they spend engaging in 32 distinct activities, which are categorized into household and caregiving tasks (13 activities), occupational duties (5 activities), sports and exercise (8 activities), transportation-related activities (3 activities), and inactivity (3 activities) [32]. The PPAQ is a well-established and reliable instrument widely utilized for assessing physical activity during pregnancy [32].

Considering the absence of universally applicable cut-off points for total physical activity scores derived from the Pregnancy Physical Activity Questionnaire (PPAQ), we utilized the total MET-h/week (including all activity levels), to categorize participants based on our sample's distribution. Using the 33rd and 67th percentiles of the participants' total MET-h/week distribution, they were categorized into three tertiles, including low, moderate and high. This tertile-based classification is a statistically neutral approach commonly used in epidemiological studies, allowing for internal validity and meaningful group comparisons within the study population without relying on any general guidelines [33,34]. It avoids dependence on external thresholds that may not align with the unique characteristics or context of the sample.

Brief Job Stress Questionnaire: This is a self-administered questionnaire containing 57 items with 4-point Likert-type responses (from "agree" = 4, to "disagree" = 1) to measure job stressors, psychosomatic complaints, and support for workers [35,36]. The questions are segregated into 11 sub-domains, including Disagreement & Indecision, Pressure on the Job, Job Description Conflict, Communication & Comfort with Supervisor, Job Related Health Concerns, Work Overload Stress, Work Underload Stress, Boredom Induced Stress, Problem of Job Security, Time Pressure and Job Barrier Stress. Within each sub-domain, scores range from 5 to 25. Scores of 14 or above suggest problem areas which predispose an individual to high risks of occupational stress, while scores <14 are categorised as low risk. The overall score is obtained from the total of all the sub-domains' scores. Overall scores will fall within the 55 to 275 range. Scores of 135 or above would suggest an unusual amount of work-related stress.

Data Analysis

Data were summarized using descriptive statistics of frequency, percentage, median, mean and standard deviation. Chi Square test was used to assess the association between physical activity level and occupational stressor domains. In addition, Spearman rank correlation test was used to explore relationships between the total work stressor value and the MET values of each of the categories of physical activity practices (household, sports, occupation, transportation). Data analysis was done with Statistical Package of Social Sciences software version 26 (SPSS Inc., Chicago, U.S.A) and the significance level was set as $p < 0.05$.

Ethical clearance was obtained from the Research Ethics Committee of the University of Nigeria Teaching Hospital, Ituku-Ozalla, Enugu State, Nigeria. Each participant signed a voluntary informed consent form before participating in the study. The confidentiality of the respondents was ensured.

RESULTS

General Characteristics of the Participants

The majority of the respondents fell within the age range of 20-30 years (63.7%), were married (93.2%), and had attained tertiary education (56.8%). A greater percentage of them reside in rural areas (68.5%), earn between 30,000-100,000 naira monthly (44.5%), and do not own a personal car (88.4%). The majority of them were in their third trimesters (58.2%), commenced antenatal classes in the second trimester of their pregnancy (46.6%), were primi gravida (60.9%), nulliparous (41.1%) and had no underlying medical condition (99.3%) (Table 1).

Table 2 presents the respondents' occupational characteristics. The majority of them had only one occupation (94.5%), were self-employed (60.3%), worked full time (95.2%), showed physical presence at work (95.6%) and had worked for more than one year (67.8%). A greater percentage were managers in their workplaces (47.3%), had no superiors whom they reported to (53.4%), had no subordinates who reported to them (64.4%), worked 7-12 hours per day (62.3%) and between 1-60 hours weekly (79.4%). The majority (34.2%) of

the participants were moderately physically active, while the remaining half had either low (32.9%) or high (32.9%) physical activity levels.
Chi-square test showed no significant (p>0.05) association between participants' total work stressor values and any of these occupational characteristics.

Table 3 presents mean values of participants' work stress scores with 'time pressure' (8.2±3.3) ranking highest, while 'job-related concern' ranked the least (5.9±1.7) work stressors which constitute occupational stress among these women. The binary categorization (high and low risk) of how work stress sub-domain contributes to participants' risk of occupational stress was also presented. Almost all the participants (99.3%) underwent usual work stress except for one whose overall work stressor score suggested unusual work stress.

Table 4 presents cross-tabulations and Chi square test results showing associations between respondents' physical activity levels and work stressors. It was observed that their physical activity levels were not significantly associated (p>0.05) with any of the work stressor domains.

Table 1: Frequency Distribution of Participants' General Characteristics (n=146)

Variable	Frequency	
Age (years)		
< 20	7	4.8
20-30	93	63.7
31-60	46	31.5
Marital status		
Single	9	6.2
Married	136	93.2
Divorced	1	0.7
Separated	0	0
Educational level		
Primary	2	1.4
Secondary	48	32.9
Tertiary	83	56.8
Post graduate	13	8.9
Ethnicity		
Igbo	141	96.6
Hausa	2	1.4
Yoruba	0	0
Others	3	2.1
Religion		
Christianity	142	97.3
Islamic	1	.7
Traditional	2	1.4
Others	1	.7
Residential area		
Urban	46	31.5
Rural	100	68.5
Monthly income		
<30k	58	39.7
30-100k	65	44.5
>100k	23	15.8
Possession of a personal car		
Yes	17	11.6
No	129	88.4
Gestational age (in trimester)		
First trimester	12	8.3
Second trimester	49	33.6
Third trimester	85	58.2
Stage of antenatal class (in trimester)		
First trimester	66	45.2
Second trimester	68	46.6
Third trimester	12	8.2
Number of children		
0	63	43.2
1	35	24
>1	48	32.8
Gravidity		
Primigravida	89	60.9
Multigravida	57	39.1
Parity		
Nulliparous	60	41.1
Primiparous	39	26.7
Multiparous	46	31.5
Medical condition		
Yes	1	0.7
No	145	99.3

Table 2: Participants' Occupational and Physical Activity Characteristics

Variable	Frequency	Percentage
Major occupation		
Students	15	10.3
Public servant	43	29.5
Self-employed	88	60.3
Employment status		
Full time	139	95.2
Part-time	7	4.1
Mode of work		
Physical attendance	140	95.6
Remote attendance	1	0.7
Blends of physical and remote attendance	5	3.4
Job position		
Manager	69	47.3
Director chief executive officer	6	4.1
Senior staff	34	23.3
Junior staff	31	21.2
Other job positions	6	4.1
Availability of superiors who you report to		
Yes	68	46.6
No	78	53.4
Availability of subordinates who report to you		
Yes	52	35.6
No	94	64.4
Average work hours per day (in hours)		
1-6	32	21.9
7-12	91	62.3
>12	23	15.8
Average work hours per week (in hours)		
1-60	116	79.4
>60	30	20.6
Duration of work experience (in months)		
1-12	47	32.2
>12	99	67.8
Other occupations or side hustle		
Yes	8	5.5
No	138	94.5
Employment status of other occupation or side hustle (n = 8)		
Full time	1	12.5
Part-time	7	87.5
Mode of work of other occupation or side hustle (n = 8)		
Physical attendance	6	75.0
Remote attendance	1	12.5
Blends of physical and remote attendance	1	12.5
Superiors to report to in other occupation (n = 8)		
Yes	0	0
No	8	100
Job position for the other occupation or side hustle (n = 8)		
Manager	5	62.5
Junior staff	3	37.5
Subordinates in the other or side hustle (n = 8)		
Yes	0	0
No	8	100
Average work hours per week in other occupations (in hours) (n = 8)		
1-6	6	75.0
7=12	1	12.5
>12	1	12.5
Average work hours per week in other occupations (in hours) (n = 8)		
1-30 hours	7	87.5
>30 hours	1	12.5
Duration of job experience in other occupation (in months) (n = 8)		
1-12	1	12.5
>12	7	87.5
Physical Activity Profile		
Low	48	32.9
Moderate	50	34.2
High	48	32.9

Table 3: Participants' Work Stress Scores (N = 146)

Work stressor sub-domain	High Risk n (%)	Low Risk n (%)	Mean±SD
Disagreement and decision	7 (4.8)	139 (95.2)	7.2±3.1
Pressure on the job	4 (2.7)	142 (97.3)	7.6±3.0
Job description conflict	4 (2.7)	142 (97.3)	6.2±2.1
Communication and comfort with the supervisor	9 (6.2)	137 (93.8)	6.4±2.4
Job-related concern	1 (0.7)	145 (99.3)	5.9±1.7
Work overload stress	8 (5.5)	138 (94.5)	7.3±2.6
Work underload stress	5 (3.4)	141 (96.6)	6.7±2.5
Boredom-induced stress	0 (0)	146 (100)	6.7±2.1
Problem of job security	6 (4.1)	140 (95.9)	7.1±3.0
Time pressure	11(7.5)	135 (92.5)	8.2±3.3
Job barrier stress	2 (1.4)	144 (98.6)	6.0±1.9
Overall score	Unusual work stress 1 (0.68%)	Usual work stress 145 (99.3%)	78.4±18.0

Additionally, a spearman correlation test showed significant relationships between the total work stressor value and each of occupation-related physical activity MET value (r=0.273; p=0.001) and total physical activity MET value (r=0.226, p=0.006) of the participants. On the other

Table 4: Association between participants' physical activity levels and work stressor domains

Variable	Low PAL (n = 48)		Moderate PAL (n = 50)		High PAL (n = 48)		χ^2 (p value)
	Low risk stressor	*High risk stressor*	*Low risk stressor*	*High risk stressor*	*Low risk stressor*	*High risk stressor*	
	n (%)	*n (%)*	*n (%)*	*n (%)*	*n (%)*	*n (%)*	
Disagreement and decision	46 (95.8)	2 (4.2)	48 (96.0)	2 (4.0)	43 (89.6)	5 (10.4)	2.246 (0.325)
Pressure on the job	47 (97.9)	1 (2.1)	47 (94.0)	3 (6.0)	46 (95.8)	2 (4.2)	0.468 (0.791)
Job description conflict	48 (100)	0 (0)	47 (94.0)	2 (4.0)	45 (93.8)	2 (4.2)	2.060 (0.357)
Communication and comfort with the supervisor	48 (100)	0 (0)	46 (92.0)	4 (8.0)	46 (95.8)	2 (4.2)	3.475 (0.176)
Job-related concern	48 (100)	0 (0)	48 (96.0)	2 (4.0)	48 (100)	0 (0)	1.952 (0.377)
Work overload stress	45 (93.8)	3 (6.3)	47 (94.0)	2 (4.0)	44 (91.7)	3 (6.25)	0.308 (0.857)
Work underload stress	47 (97.9)	1 (2.1)	48 (96.0)	2 (4.0)	44 (91.7)	4 (8.3)	1.764 (0.414)
Boredom-induced stress	48 (100)	0 (0)	50 (100)	0 (0)	48 (100)	0 (0)	-
Problem of job security	46 (95.8)	2 (4.2)	48 (96.0)	2 (4.0)	44 (91.7)	4 (8.3)	1.133 (0.568)
Time pressure	47 (97.9)	1 (2.1)	45 (90.0)	5 (10.0)	41 (85.4)	7 (14.6)	3.870 (0.144)
Job barrier stress	48 (100)	0 (0)	46 (92.0)	4 (8.0)	47 (97.9)	0 (0)	4.014 (0.134)

Percentages are derived from the total number of participants within a specific category of physical activity level; PAL – Physical activity level; χ^2– Chi-square statistical test symbol

hand, participants' total work stressor values were not significantly correlated with their household-related (r=0.124, p=0.137), transport-related (r=0.004, p=0.122), sports-related (r=0.047, p=0.572) physical activity MET values.

DISCUSSION

This study investigated the relationship between occupational stress and physical activity among pregnant women in the Enugu metropolis. The findings of this study demonstrate this relationship while highlighting critical sociodemographic and occupational patterns within this population.

Most of the participants in this study demonstrate having a low risk of occupational stress, with almost all participants experiencing "usual" work stress across stress dimensions. Only a few reported high occupational stress risks, primarily due to time pressures. The low occupational stress risks in this study may be attributed to the high proportion of self-employed women who may have greater autonomy over their work schedules compared to formal employment settings. Generally, the highest occupational stressors for pregnant women were time pressure and pressure on the job. Time pressure emerging as the highest occupational stressor is consistent with a previous study indicating that frequent overtime work and fewer break times are associated with occupational stress [9]. Also, working more than 40 hours/ week has been associated with high work stress among pregnant working women [37]. Pregnant working women experience a heightened time pressure, juggling employment with personal and family demands [38]. However, our finding contrasts with similar studies where pregnant women frequently report elevated stress due to workload [7,8]. Our population, being mostly self-employed, may have different stress profiles.

The physical activity (PA) profile of the participants in this study showed that about one-third had moderate activity levels, and an equal number of them had either low or high levels. This finding is notable given that pregnancy is frequently linked to reduced PA, due to pregnancy discomforts and lack of time [39,40]. A study reported that pregnant women in Africa have low PA levels, which further decline as the pregnancy progresses [41]. In our sample, however, substantial proportions engaged in moderate or high activity, perhaps reflecting the high rate of full-time self-employment and physically active occupations. In a study carried out in Ibadan, it was reported that being employed reduced the odds of being physically inactive. Nevertheless, our findings fall short of the ideal, as a substantial number of these pregnant women had low PA levels.

No significant association was observed between the various occupational stressors and physical activity levels. However, the total occupational stress score correlated positively with occupation-related PA and total PA. Thus, women with higher overall work stress tend to report higher occupational and total PA. On the other hand, increased occupational and total physical activity may further exacerbate occupational stress. For instance, full-time self-employed women who work up to 40 hours per week may face increased time pressures and work overload while engaging in occupational and household tasks, inadvertently elevating their activity levels. However, previous studies have reported that stress impacts efforts to be physically active [42].

Given that time pressure was the primary stressor, workplace interventions such as flexible scheduling or task delegation could help mitigate stress for pregnant employees. Additionally, early education on the benefits of physical activity and stress management during pregnancy should be integrated into community health programs. Finally, future research should explore longitudinal changes in occupational stress and physical activity throughout pregnancy. Given the scanty data on occupational stress among pregnant women in Africa and particularly Nigeria, more studies in diverse settings are warranted.

This study contributes novel insights into occupational stress and physical activity in an understudied population. However, its cross-sectional design limits causal inferences, and self-reported data may introduce recall bias. The reliance on the PPAQ, while validated, may not fully capture culturally specific activities in Nigerian contexts. Future longitudinal studies and qualitative research may provide greater insights into these relationships.

CONCLUSION

The findings underscore the need for workplace interventions tailored to pregnant women in low-resource settings, such as flexible hours, stress-

management programs, and supportive practices and structures. Healthcare providers should screen for occupational stress during antenatal visits and promote culturally relevant strategies to balance activity and rest.

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