Relationship of work stress and dysglycemia among healthcare workers doing shift work in a level 1 government hospital in Antipolo City

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Abstract

Introduction This cross-sectional study investigated the relationship between work stress and dysglycemia among healthcare workers engaged in shift work at a level 1 government hospital in Antipolo City, Philippines.

Methods Work stress was assessed using the Effort-Reward Imbalance (ERI) Questionnaire, and dysglycemia was measured through a 75g oral glucose tolerance test (OGTT).

Results A total of 126 healthcare workers aged 20–55 years participated Results showed that 65.1% of participants experienced work stress, with nurses reporting the highest prevalence (43.9%). Dysglycemia was present in 33.3% of participants, predominantly in the form of impaired glucose tolerance. Despite the high prevalence of both work stress and obesity (61.9%), no statistically significant associations were found between work stress and dysglycemia ($p = .51$), gender and work stress ($p = .59$), occupation and work stress ($p = .059$), or obesity and dysglycemia ($p = .70$).

Conclusion The findings suggest that while work stress is common among healthcare workers, especially nurses, it may not directly predict dysglycemia in relatively young and active populations. However, the long-term metabolic risks associated with chronic occupational stress should not be overlooked. Future longitudinal studies with larger samples are recommended to better assess causality and guide workplace wellness programs.

Key words: Dysglycemia, work stress, shift work, effort-reward imbalance, healthcare workers, occupational health

Dysglycemia, which includes impaired fasting glucose (IFG) and impaired glucose tolerance (IGT), is a critical early marker in the progression toward type 2 diabetes mellitus (T2DM). Globally, the burden of diabetes is increasing, with the International Diabetes Federation (2019) estimating that 463 million adults were living with diabetes in 2019, with projections indicating a 51% rise by 2045. In the Philippines, data from the 8th National Nutrition Survey reveal that 4.2% of adults aged 20 and above have IFG (Jimeno, 2025). Despite this, local data on dysglycemia prevalence among healthcare workers remains limited, even though this population faces unique occupational risks.

Healthcare workers engaged in shift work are particularly vulnerable to metabolic disorders due to circadian disruption. Shift work has been shown to disturb normal biological rhythms, leading to hormonal imbalances and impaired glucose metabolism. Pan et al. (2011), in a large prospective

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study, found that female nurses working rotating night shifts had an increased risk of developing T2DM. Similarly, Sharma et al. (2017) noted that night-shift healthcare workers had higher postprandial glycemic excursions and delayed insulin responses. These findings highlight the physiologic impact of disrupted sleep-wake cycles on glucose regulation among shift workers.

Work stress further compounds this risk. The Effort-Reward Imbalance (ERI) model by Siegrist (1996) conceptualizes work stress as the result of an imbalance between the effort expended at work and the rewards received. Chronic exposure to such imbalance has been linked to adverse metabolic outcomes. Garbarino et al. (2019) demonstrated that occupational stress is associated with increased risk of metabolic syndrome, including hyperglycemia, and emphasized the role of sleep problems as a mediating factor. Tzeng et al. (2012) also reported that high ERI scores were associated with poor physical and psychological well-being among healthcare professionals. In the Philippine context, Jabonete et al. (2018) found that hospital nurses reported moderate levels of work stress, though their study did not include other healthcare roles such as physicians or ancillary staff.

Given these considerations, this study aims to determine the relationship between work stress and dysglycemia among healthcare workers engaged in shift work in a level 1 government hospital in Antipolo City. Specifically, it seeks to: (1) assess the prevalence of work stress, dysglycemia, and obesity; (2) explore the relationships of gender and occupation with work stress; and (3) examine the association between obesity and dysglycemia.

Methods

Ethics clearance was obtained from the University of the East Ramon Magsaysay Memorial Medical Center Ethics Review Committee. This study used a cross-sectional analytic design to investigate the relationship between work stress and dysglycemia among healthcare workers engaged in shift work at a level 1 government hospital in Antipolo City, Philippines. The study population included hospital personnel aged 20 to 55 years who worked outside the traditional 8:00 AM to 5:00 PM schedule. Individuals previously diagnosed with pre-diabetes or diabetes, pregnant women, and those taking glucose-lowering medications were excluded.

A total of 126 participants were selected from a pool of 187 eligible employees using simple random sampling using a master list of employees, and randomization was performed using the RANDBETWEEN function in Microsoft Excel. The sample included physicians, nurses, and ancillary staff such as midwives, laboratory technicians, and administrative personnel.

Data collection involved face-to-face interviews, during which participants completed the Effort-Reward Imbalance (ERI) Questionnaire to assess work stress. An ERI score of >1 means that work stress is present. Anthropometric measurements, including height and weight, were taken to compute body mass index (BMI), with obesity defined as BMI >25 based on Asia-Pacific guidelines. Dysglycemia was assessed through a 75g oral glucose tolerance test (OGTT), with fasting plasma glucose >100 mg/dL and/or 2-hour plasma glucose >140 mg/dL classified as dysglycemia.

Data were analyzed using OpenEpi. Descriptive statistics were used for demographic profiling. Chi-square tests and prevalence ratios were applied to examine associations between variables, including work stress, dysglycemia, obesity, gender, and occupation. A p-value <0.05 was considered statistically significant.

Results

Table 1 shows the demographic profile of the participants. The participants were relatively young with a mean age of 36. There is a slight predominance of female participants (55.6%). Nurses comprised the largest proportion of the respondents (36.5%). A significant number of the participants were obese (61.9%).

Table 1. Demographic profile of the participants (N=126).

	Number of Participants (n, %)
Mean Age	36, SD = 7.5
Gender	
Male	56, 44.4%
Female	70, 55.6%
Number of obese participants	78, 61.9%
Job Distribution	
Doctors	37, 29.4%
Nurses	46, 36.5%
Ancillary staff	43, 34.1%

Data in Table 2 indicate that more participants reported work stress (65.1%). Across the three job categories, nurses represented the highest group (43.9%) experiencing work stress compared to ancillary staff and doctors.

Table 2. Distribution of work stress among healthcare workers doing shift work (n = 126).

Parameter	n	%
With work stress	82	65.1
Physicians	22	26.8
Nurses	36	43.9
Ancillary	24	29.3
Without work stress	44	34.9
Physicians	15	34.1
Nurses	10	22.7
Ancillary	19	43.2

Table 3 shows the prevalence of dysglycemia among the participants. Although most of the participants still have normal blood glucose, it is noted that 33.3% of the participants already have dysglycemia. Among these participants with dysglycemia, 88.1% of them have impaired glucose tolerance indicating an impaired compensatory response of their bodies to increases in blood sugar during meals.

Table 3. Distribution of dysglycemia among healthcare workers doing shift work (n = 126).

Parameter	n	%
With dysglycemia	42	33.3
FPG >=100 mg/dl	27	64.29
2h PPG >=140 mg/dl	37	88.10
FPG>=100 mg/dl, AND 2h PPG >=140 mg/dl	22	52.38
Without dysglycemia	84	66.7

Only 35.37% of the participants with work stress have dysglycemia and only 29.55% of the participants without work stress have dysglycemia (Table 4). Although participants with work stress had a higher proportion of dysglycemia compared to those without work stress (Prevalence Ratio = 1.197), the association was not statistically significant (p = .51).

Work stress was prevalent among both genders, reported by 62.5% of male participants and 67.14% of female participants (Table 5). A slightly higher proportion of female participants reported work stress compared to males (Prevalence Ratio = 0.93, p = .59), but this difference was not statistically significant.

Across all three job categories, a significant number of participants have reported work stress than those without work stress (doctors: 59.46%, nurses: 78.26%, ancillary: 55.81%) Although work stress is most prevalent among nurses, it was not statistically significant (p = .059) (Table 6).

Table 7 shows that among the obese participants, the prevalence of dysglycemia was 34.62% and among the non-obese participants, the prevalence was 31.25%. Although obesity was slightly prevalent among obese participants than non-obese participants with a prevalence ratio of 1.12, statistical analysis did not provide sufficient evidence to establish a relationship between obesity and dysglycemia (p = .70)

Table 4. Relationship of work stress and dysglycemia among healthcare workers doing shift work (N= 126)

	With Dysglycemia		Without dysglycemia		Total
	Observed	%	Observed	%	
With work stress	29	35.37	53	64.63%	82
Without work stress	13	29.55	31	70.45%	44
Total	42		84		126

x^2 (1, N = 126) = 0.43, p = .51
Prevalence ratio (PR): 1.197, 95% CI [0.6961, 2.058]

Table 5. Relationship of gender and work stress among healthcare workers doing shift work (n = 126)

	With Work Stress		Without Work Stress		Total
	Observed	%	Observed	%	
Male	35	62.50	21	37.50	56
Female	47	67.14	23	32.9	70
Total	82		44		126
x^2 (1, N = 126) = 0.29, p = .59 Prevalence Ratio (PR): 0.9309, 95% CI [0.7172,					

Table 6. Relationship of occupation and work stress among healthcare workers doing shift work (n=126).

	With Work Stress		Without Work Stress		Total
	Observed	%	Observed	%	
Doctor	22	59.46	15	40.54	37
Nurses	36	78.26	10	36.96	46
Ancillary	24	55.81	19	44.19	43
Total	84		44		126
x^2 (2, N = 126) = 5.66, p = .059					

Table 7. Relationship of obesity and dysglycemia among healthcare workers doing shift work (n=126).

	With Dysglycemia		Without dysglycemia		Total
	Observed	%	Observed	%	
Obese	27	34.62	51	65.38	78
Non-obese	15	31.25	33	68.75	48
Total	42		84		126
x^2 (1, N = 126) = 0.15, p = .70 Prevalence Ratio (PR): 1.12, 95% CI [0.6594, 1.861]					

Discussion

This study investigated the relationship between work stress and dysglycemia among shift-working healthcare workers in a level 1 government hospital in Antipolo City. The primary hypothesis posited that high work stress, as measured by the Effort-Reward Imbalance (ERI) model, would be associated with dysglycemia. However, the findings did not support this hypothesis. Although work stress was prevalent among participants (65.1%), only 33.3% exhibited dysglycemia, and the association between the two was not statistically significant ($p = .51$). Similar findings were observed: there was no significant association between gender and work stress ($p = .59$), occupation and work stress ($p = .059$), or obesity and dysglycemia ($p = .70$).

The lack of a significant relationship between work stress and dysglycemia contrasts with prior studies. Garbarino et al. (2019) reported that chronic occupational stress was linked to metabolic syndrome, and Li et al. (2012) identified associations between job strain and diabetes, especially among obese individuals. Heraclides et al. (2011) further suggested that obesity modifies the relationship between job stress and diabetes risk. However, these studies were often conducted in older populations or used longitudinal designs, which may account for the discrepancy. The relatively young mean age of participants in this study (36 years) could have conferred a degree of metabolic resilience. Alhumaid et al. (2022) supported this, citing that younger individuals possess greater hormonal and metabolic flexibility, allowing better regulation of blood glucose under stress.

The high prevalence of work stress, particularly among nurses, aligns with existing literature. Tzeng et al. (2012) found that nurses often report higher ERI ratios compared to other healthcare professionals. In this study, several hospital-related factors may have contributed to elevated stress levels: staffing shortages, high nurse-to-patient ratios (often 1:7 to 1:10 in the medical ward), long working hours, and physically demanding tasks such as repeated stair use. These findings are consistent with McHugh et al. (2023) and Kim et al. (2023), who reported that heavy workloads and overtime are linked to nurse burnout and intent to leave the profession. Additionally, this study was conducted during the tail end of the COVID-19 pandemic, a period still marked by infection control protocols (e.g., PPE use, triage measures, isolation policies), which have been shown to heighten perceived work stress (Hoedl et al., 2020).

Despite the high prevalence of obesity (61.9%) among participants, dysglycemia remained relatively low. This may be attributed to several protective factors. The physically active nature of hospital work may have improved insulin sensitivity, as suggested by Ahmed et al. (2020). Moreover, health literacy and access to healthcare services likely enabled early self-monitoring and preventive behaviors, as discussed by Bailey et al. (2014). Majority of the participants with dysglycemia (88.1%) exhibited impaired glucose tolerance (IGT), a postprandial phenomenon that may reflect early stages of beta-cell dysfunction. Nonetheless, the young age of the population and the absence of long-term stress exposure might explain the lack of overt metabolic disturbances despite the presence of risk factors.

Key limitations of the study should be acknowledged. The cross-sectional design precludes causal inferences. Additionally, reliance on a single-site hospital sample may reduce the generalizability of findings to other institutions or geographic regions.

Conclusion

This study demonstrated that while work stress is highly prevalent among healthcare workers, especially nurses, it is not significantly associated with dysglycemia in a relatively young and active hospital population. The absence of significant associations may be due to protective factors such as youth, occupational physical activity, and health literacy. Nonetheless, the high burden of work stress warrants institutional attention, as its long-term consequences may manifest beyond the study's timeframe. Regular monitoring of staff well-being, workplace stress interventions, and metabolic health screening are recommended. Future research should adopt a longitudinal design to explore the cumulative effects of chronic stress on metabolic outcomes, and consider stratification by age, role, and stress adaptation mechanisms to better understand subgroup vulnerabilities.

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