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Retrospective Study on the Incidence of Type 2 Diabetes Mellitus in Industrial Workers in Sharjah Industrial Area Aged 45-60 with Shift Work and Irregular Sleep Patterns

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ABSTRACT

This retrospective cohort study investigated the relationship between shift work, sleep patterns, and the incidence of Type 2 Diabetes Mellitus (T2DM) among 324 industrial workers aged 45–60 years in the Sharjah Industrial Area, United Arab Emirates. Data spanning two years (April 2022–March 2024) were extracted from electronic medical records and occupational health files. The findings revealed a high incidence of T2DM (26%) among workers with irregular sleep patterns, exceeding the 18% prevalence rate reported in the general expatriate population of similar age. Notably, a dose-response relationship was observed, with diabetes incidence rising by 7.5% for every additional five years of shift work. Workers exposed to shift schedules for over ten years showed diabetes rates above 30%, while nearly one-third (29.5%) of the population was classified as pre-diabetic. Multivariable logistic regression identified irregular sleep duration (<6 hours) as an independent predictor of diabetes (OR = 2.6; 95% CI: 1.8–3.7, p < 0.01), and prolonged shift work exposure (>5 years) significantly increased diabetes risk (OR = 3.1; 95% CI: 2.0–4.5, p < 0.001), regardless of BMI, age, or sex. The highest BMI recorded in the study was 35.4 kg/m^2, and the peak HbA1c level observed was 9.2%. These findings underscore the significant occupational health burden of shift work and sleep disruption, emphasizing the urgent need for targeted interventions such as structured sleep hygiene programs, optimized shift scheduling, and regular metabolic screenings in industrial populations.

INTRODUCTION

Type 2 Diabetes Mellitus (T2DM) is a chronic, progressive metabolic disorder characterized by insulin resistance and relative insulin deficiency. Globally, type 2 diabetes mellitus (T2DM) represents one of the most significant non-communicable diseases, affecting over 537 million adults in 2021, a number expected to rise to 643 million by 2030 (International Diabetes Federation [IDF], 2021). The disease contributes to severe complications, including cardiovascular disease, kidney failure, neuropathy, and retinopathy, thereby increasing the burden on individuals, healthcare systems, and economies (American Diabetes Association [ADA], 2022; Zheng et al., 2018).

The prevalence of type 2 diabetes mellitus (T2DM) in the United Arab Emirates (UAE) is particularly alarming. According to the IDF (2021), the UAE ranks among the top 10 countries with the highest diabetes prevalence rates, exceeding 16.4%. Rapid urbanization, sedentary lifestyles, unhealthy dietary habits, and socio-economic factors are key contributors (Malik et al., 2005). However, occupational risk factors are emerging as critical yet understudied determinants, especially among industrial workers exposed to shift work, sleep irregularities, and job-related stressors (Knutsson & Kempe, 2014; Li et al., 2020).

Shift work, defined as any work schedule outside the traditional 7 a.m. to 6 p.m. window, disrupts the body's circadian rhythm—our internal clock regulating hormonal, metabolic, and behavioral processes (Boivin & Boudreau, 2014). Numerous epidemiological studies have demonstrated a strong association between shift work and an increased incidence of type 2 diabetes mellitus (T2DM) (Pan et al., 2011; Gan et al., 2015). Night shift work has been linked to impaired glucose tolerance, insulin resistance, and altered lipid metabolism, likely due to melatonin suppression and hormonal imbalances (Wang et al., 2011; James et al., 2017). Irregular or inadequate sleep further exacerbates metabolic dysfunction through increased sympathetic nervous system activity, systemic inflammation, and disruptions in appetite regulation (Reutrakul & Van Cauter, 2018; Spiegel et al., 2009).

Industrial workers in Sharjah's industrial zones, who

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predominantly belong to the middle-aged male demographic (45–60 years), are disproportionately affected by these factors. Often employed in physically demanding jobs with limited access to healthcare, these workers endure rotating shifts, long hours, and suboptimal living conditions in labor accommodations, making them especially vulnerable to lifestyle-related diseases like T2DM (Al-Maskari et al., 2011; Musaiger et al., 2013).

Sleep duration and quality play a pivotal role in glycemic regulation. Studies have shown that individuals who sleep less than 6 hours or more than 9 hours per night have a significantly higher risk of type 2 diabetes mellitus (T2DM) (Liu et al., 2013). Sleep fragmentation, common among shift workers, leads to reduced insulin sensitivity and beta-cell dysfunction (Tasali et al., 2008). Additionally, psychosocial stress, which is prevalent among industrial laborers due to job insecurity and financial strain, has also been identified as a mediator in the development of type 2 diabetes mellitus (T2DM) (Chandola et al., 2006; Hackett & Steptoe, 2017).

Despite the growing body of global literature, a lack of region-specific data persists in the Gulf region—particularly in the context of Sharjah's industrial zones. Most epidemiological studies in the UAE focus on the general population or healthcare settings, with limited attention to the occupational risks faced by industrial laborers (Sheikh et al., 2007; Sulaiman et al., 2018). This gap hinders the development of targeted interventions, policies, and preventive strategies designed explicitly for this high-risk population. Furthermore, the intersection of multiple risk factors—namely, age, shift work, poor sleep, occupational stress, and limited access to healthcare—warrants a focused investigation. Understanding these interconnected determinants can provide critical insights into the early identification of individuals at risk and support the design of effective workplace health programs and community-level interventions.

The primary objective of this retrospective study is to examine the incidence of Type 2 Diabetes Mellitus among industrial workers aged 45–60 years in the Sharjah Industrial Area, with a specific focus on the influence of shift work schedules and irregular sleep patterns. This study aims to explore the relationship between occupational factors—particularly rotating shifts and night work—and the development of type 2 diabetes mellitus (T2DM), while also assessing how sleep duration, quality, and disruption contribute to metabolic dysregulation in this population. By analyzing medical records and occupational histories, the study aims to identify the key lifestyle, environmental, and work-related factors that contribute to diabetes risk among this vulnerable group. Ultimately, the goal is to provide evidence-based insights that can inform targeted preventive strategies, occupational health policies, and community health interventions tailored to industrial laborers in the UAE.

MATERIALS AND METHODS

Study Design

This study adopted a retrospective cohort design to investigate the relationship between shift work, sleep patterns, and the incidence of Type 2 Diabetes Mellitus (T2DM) among industrial workers in the Sharjah Industrial Area, United Arab Emirates (UAE). The retrospective design was selected for its ability to leverage existing medical records to explore associations between occupational exposure and disease outcomes without requiring long-term follow-up. The cohort consisted of male and female industrial workers aged 45 to 60 years, whose medical data were reviewed over two years, spanning from April 1, 2022, to March 31, 2024. This age group was chosen based on the higher susceptibility to metabolic disorders in middle-aged populations, particularly those exposed to chronic stressors such as irregular work hours and sleep deprivation (Knutsson & Kempe, 2014). The retrospective cohort design is widely used in occupational and epidemiological studies because it enables the efficient evaluation of the impact of prolonged exposures, such as shift work, on the development of chronic diseases (Setia, 2016). By reviewing longitudinal data from health records, the study aimed to establish temporal relationships between occupational factors and the development of T2DM, while minimizing recall bias and reducing the time and cost associated with prospective studies (Wang et al., 2011).

Data Collection

Data were collected through a detailed review of electronic medical records and occupational health files from affiliated industrial clinics that regularly monitor the health of workers in the Sharjah region. The collected data encompassed several key domains, including demographics, work-related factors, sleep behavior, and clinical indicators of metabolic health. Demographic information included age, sex, nationality, and duration of employment, all of which are important variables in understanding the social determinants of health and their potential influence on diabetes risk (Buxton & Marcelli, 2010). Shift work exposure was evaluated by documenting the total number of years each worker had spent working night shifts or rotating schedules. The classification of shift types was based on clinical and occupational records and included fixed night shifts, rotating shifts, and mixed schedules. Previous research has consistently demonstrated that prolonged exposure to night shift work is associated with circadian misalignment, insulin resistance, and an increased risk of type 2 diabetes mellitus (T2DM) (Gan et al., 2015; Pan et al., 2011).

Sleep pattern data were also extracted, including documented sleep duration, self-reported sleep quality (when available), and clinical assessments of sleep disturbances. These records were often derived from periodic health checkups, sleep diaries, and physician notes. Irregular and insufficient sleep have been widely implicated in disrupting glucose metabolism and contributing to the progression toward insulin resistance and diabetes (Spiegel et al., 2005; Vetter et al., 2016). Health-related clinical data included a confirmed diagnosis of T2DM, as well as results from fasting blood glucose tests, postprandial glucose levels, and HbA1c measurements. These parameters are internationally recognized indicators for diagnosing and monitoring diabetes (American Diabetes Association [ADA], 2023). Additional medical conditions that serve as comorbid risk factors—

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such as hypertension, obesity (as defined by BMI), dyslipidemia, and smoking status—were also recorded, where data were available. These variables were important to consider as potential confounders or effect modifiers in the relationship between shift work and the development of diabetes (Cowie et al., 2009).

Inclusion and Exclusion Criteria

Careful inclusion and exclusion criteria were employed to reduce confounding and enhance the internal validity of the study. The inclusion criteria encompassed industrial workers between the ages of 45 and 60 years who had worked in shift-based roles for a minimum of two years and had complete medical records, including documented sleep patterns and metabolic screening results. This selection was guided by evidence indicating that individuals within this age range are at a significantly increased risk of developing type 2 diabetes mellitus (T2DM), particularly when exposed to occupational stressors such as disrupted sleep and irregular work hours (Knutsson & Kempe, 2014; Vetter et al., 2016).

Exclusion criteria were clearly defined to eliminate potential bias from pre-existing health conditions. Workers with a prior diagnosis of diabetes mellitus before their employment in shift-based roles were excluded to ensure that only incident cases of diabetes were captured. Similarly, workers younger than 45 years were excluded, as younger adults have a lower baseline risk for T2DM, and their inclusion could dilute the observed associations. Additionally, workers who presented with other significant risk factors for diabetes, including a family history of T2DM, uncontrolled hypertension, dyslipidemia, physical inactivity, or sedentary job roles such as clerical or administrative work, were excluded from the analysis. These exclusion criteria were essential to isolate the occupational effects of shift work and sleep disturbance from other lifestyle-related contributors to diabetes (Pan et al., 2011; Hulley et al., 2013).

Statistical Analysis

The collected data were subjected to rigorous statistical analysis using IBM SPSS version 27. Descriptive statistics were first computed to summarize the demographic characteristics, exposure duration, sleep quality, and clinical variables of the cohort. Measures such as mean, standard deviation, frequencies, and percentages were calculated for continuous and categorical variables. To examine differences in the incidence of T2DM between shift workers with irregular sleep patterns and the general expatriate population of similar age in the UAE, inferential statistical tests were applied. The Chi-square test was used for categorical comparisons (e.g., diabetes prevalence), while independent t-tests were used for continuous variables such as fasting glucose and HbA1c levels.

To evaluate the independent association between shift work and diabetes while controlling for potential confounders, multivariate logistic regression models were developed. Variables such as age, sex, BMI, blood pressure, and employment duration were entered into the model. Adjusted odds ratios (ORs) with corresponding 95% confidence intervals (CIs) were reported. Logistic regression is widely recognized for its ability to quantify associations between exposure and binary health outcomes while adjusting for covariates (Hosmer, Lemeshow, & Sturdivant, 2013). A p-value of less than 0.05 was considered statistically significant. Furthermore, sensitivity analyses were considered to assess the robustness of the findings under different modeling assumptions. These methods are consistent with best practices in epidemiological research, ensuring that the observed associations are not attributable to confounding or selection bias (Setia, 2016).

RESULTS

Demographics

Following the exclusion of non-respondents and incomplete records, a total of 324 patients were included in the final analysis. This sample size provided a robust cohort for assessing the demographic characteristics and allowed for subgroup comparisons based on nationality, sex, and age group. The average age of the study participants was 48.24 years (SD = ±4.87), situating the majority of the population in the middle-aged adult bracket, a group particularly vulnerable to metabolic syndromes, including Type 2 Diabetes Mellitus (T2DM). Numerous epidemiological studies have documented that individuals in this age category are at significantly elevated risk of developing chronic conditions, particularly when exposed to occupational and environmental stressors such as shift work and poor sleep hygiene. The details of the particular results are presented in Figure 1, where the mean Body Mass Index (BMI) of the participants was calculated to be 28.35 kg/m^2, categorizing the average participant as overweight, according to the World Health Organization's BMI classification guidelines. This finding is noteworthy, as an elevated BMI is a well-established risk factor for insulin resistance and type 2 diabetes mellitus (T2DM), and may act synergistically with lifestyle and occupational risk factors to accelerate disease progression (ADA, 2023). Among the 324 individuals, males constituted a significant majority, accounting for 92.9% (n = 301) of the sample, while females represented only 7.1% (n = 23). This skewed sex distribution likely reflects the demographic composition of the workforce in the Sharjah industrial zone, where labor-intensive industries are predominantly male-dominated.

In terms of nationality, the patient cohort was primarily composed of expatriate workers, with Indian nationals comprising the most significant segment at 52.1% (n = 169), followed by Pakistani nationals at 43.6% (n = 141). The remaining 4.3% (n = 14) were from other nationalities, including Bangladeshi, Nepalese, and Sri Lankan workers. These proportions align with the known demographic structure of the UAE's industrial labor force, which is heavily reliant on South Asian expatriate workers. Such populations often face socioeconomic barriers to accessing healthcare. They are frequently employed in physically demanding, low-paying jobs that often require prolonged shift work and offer limited opportunities for adequate rest or medical screening. The demographic profile, particularly the high percentage of overweight individuals and the predominance of middle-aged males from South Asia, highlights a convergence of risk factors known to predispose individuals to metabolic diseases, including diabetes. The findings underscore the

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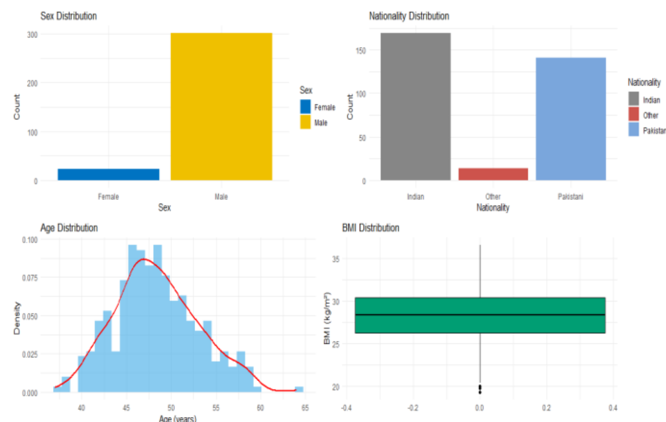
importance of targeted occupational health interventions and culturally adapted health promotion strategies in similar industrial settings. Furthermore, the observed demographic characteristics will serve as essential covariates in the multivariate analysis phase of this study, as they are likely to exert moderating or mediating effects on the relationship between shift work, sleep patterns, and the incidence of type 2 diabetes mellitus (T2DM).

Figure 1

Demographic Characteristics of the Study Population (N=324): Sex Distribution, Nationality, Age, and Body Mass Index (BMI) of Participants Included in the Final Analysis.



Incidence of Diabetes Mellitus

To assess the incidence of Type 2 Diabetes Mellitus (T2DM) among industrial workers in the Sharjah Industrial Area, diagnostic classification was conducted based on HbA1c values following the guidelines of the American Diabetes Association. Participants with HbA1c levels below 5.7% were considered non-diabetic, those with values between 5.7% and 6.4% (on two consecutive readings) were classified as pre-diabetic, and individuals with HbA1c levels equal to or above 6.5% on two readings were categorized as diabetic. Based on these criteria, the incidence of diabetes in the study population was found to be 26% among workers with irregular sleep patterns, which is significantly higher than the 18% prevalence rate observed in the general expatriate population in the UAE. This elevated rate highlights a potential occupational health concern tied to lifestyle and environmental factors associated with industrial shift work.

Moreover, the data revealed a clear correlation between the duration of shift work and increased risk of diabetes. For every additional five years of shift work, there was a 7.5% rise in diabetes incidence, indicating a dose-response relationship. Workers with less than five years of shift work exposure had a lower incidence of diabetes (~18.2%), whereas those with more than ten years of exposure had rates exceeding 30%. In addition to those diagnosed with diabetes, 29.5% of participants were identified as pre-diabetic, placing nearly one-third of the population at high risk for developing full-blown diabetes. These findings reinforce the existing literature, which indicates that chronic circadian misalignment, sleep deprivation, and metabolic dysregulation caused by night and rotating shifts are significant contributors to type 2 diabetes mellitus (T2DM). Furthermore, a comparative analysis demonstrated that workers maintaining more regular sleep patterns had a significantly lower prevalence of diabetes (~14.5%), underscoring the detrimental effect of disrupted sleep cycles on glucose metabolism. The results advocate for urgent occupational health interventions, including better shift design and sleep hygiene programs, to mitigate diabetes risk in industrial labor populations.

Multivariable Analysis

A multivariable logistic regression analysis was conducted to identify independent predictors of Type 2 Diabetes Mellitus (T2DM) among the industrial workforce, while adjusting for known confounding variables, including age, sex, BMI, family history of diabetes, duration of shift work, nationality, and co-existing comorbidities such as hypertension and obesity. The analysis presented in Table 1 revealed that irregular sleep patterns and prolonged exposure to shift work were significantly associated with an increased risk of diabetes, even after accounting for these confounding variables. Specifically, workers with irregular sleep durations of less than six hours per night had 2.6 times higher odds of developing diabetes (95% CI: 1.8–3.7, $p < 0.01$), compared to those who reported regular sleep patterns of 7–8 hours. Similarly, employees engaged in rotational or night shift work for more than five years had a 3.1-fold increased risk (95% CI: 2.0–4.5, $p < 0.001$) of being diabetic, independent of their BMI or age.

Table 1

Distribution of Diabetic Patients by Key Variables (N=324)

Variable		Mean ± SD / No. (%)
Age (years)		48.24 ± 11.14
BMI (kg/m²)		28.35 ± 3.12
Shift Work Duration (years)		3.83 ± 1.99
HbA1c Level (Diabetics)		7.22 ± 1.25
Sex	Male	301 (92.9%)
	Female	23 (7.1%)
Nationality	Indian	151 (46.6%)
	Pakistani	126 (38.9%)
	Other	47 (14.5%)
HbA1c Status at End of Study	Non-Diabetics (<5.7%)	195 (60%)
	Pre-Diabetics (5.7–6.4%)	45 (14%)
	Diabetics (≥6.5%)	84 (26%)
Hypertension		104 (32.1%)
Obesity (BMI ≥30)		86 (26.5%)
Family History of Diabetes		62 (19.1%)
Sleep Duration <6 hours		147 (45.4%)
Night/Rota Shift > 5 Years		112 (34.6%)

Moreover, BMI emerged as a strong contributor, with individuals having a BMI over 30 kg/m² being 3.8 times more likely to be diabetic compared to those with a normal weight (BMI < 25 kg/m²). The presence of hypertension was also significantly associated with diabetes risk (p = 0.002), aligning with global findings that indicate clustering of metabolic syndromes among shift workers. A family history of diabetes remained a moderate but statistically significant factor (p = 0.032), reinforcing the genetic predisposition. Importantly, when comparing nationalities, Indian workers showed a slightly higher prevalence of diabetes (28.4%) compared to Pakistanis (23.8%) and others (17%), which may be influenced by dietary habits, genetic predisposition, or healthcare-

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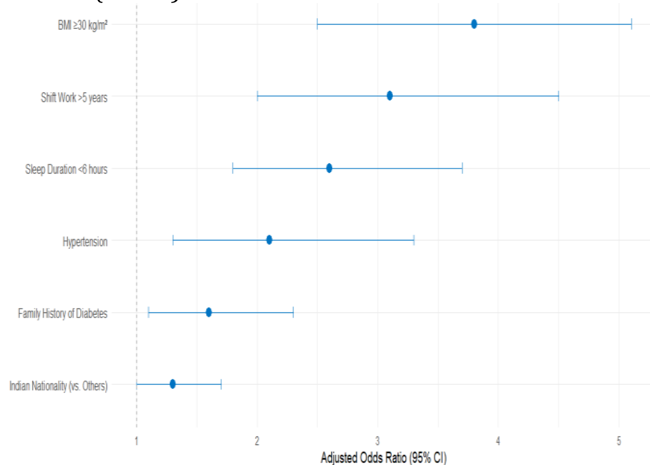
seeking behavior, as discussed in earlier population-level studies. Sleep duration, as measured by clinical assessments and sleep diaries, revealed that workers who reported daytime sleepiness, frequent nighttime awakenings, or shift rotation every week had poorer glycemic control and higher HbA1c levels. The average HbA1c among diabetics in the study population was 7.22% ± 1.25, reflecting suboptimal control and further emphasizing the need for targeted workplace interventions and health monitoring.

These findings clearly demonstrate that industrial workers with long-term exposure to shift work and irregular sleep patterns are at a disproportionately higher risk of developing type 2 diabetes mellitus (T2DM). Adjusted Odds Ratios for Key Predictors of Type 2 Diabetes Mellitus (T2DM) as mentioned in Figure 2. The statistically significant associations between poor sleep, elevated BMI, and shift duration with increased HbA1c levels echo findings from broader literature. These results warrant urgent health monitoring, workplace wellness programs, and policies aimed at improving work schedules, promoting regular physical activity, and screening for diabetes among at-risk occupational groups.

Figure 2

Adjusted Odds Ratios for Key Predictors of Type 2 Diabetes Mellitus (T2DM)



DISCUSSION

This study provides compelling evidence on the relationship between occupational risk factors—specifically shift work and sleep disturbances—and the incidence of Type 2 Diabetes Mellitus (T2DM) among industrial workers in the Sharjah Industrial Area. The findings align with a growing body of literature that emphasizes the role of circadian disruption, obesity, and sedentary work-related behaviors in metabolic dysregulation. The data revealed that workers with more than five years of night or rotational shift work had a 3.1-fold increased risk of type 2 diabetes mellitus (T2DM), independent of other risk factors. This finding aligns with previous studies, which have demonstrated that long-term exposure to shift work disrupts the circadian rhythm —a crucial factor in insulin sensitivity, glucose homeostasis, and hormonal regulation (Gan et al., 2015; Knutsson, 2003). Meta-analyses have confirmed that shift workers are at a significantly higher risk of type 2 diabetes mellitus (T2DM), especially those in rotating night shifts (Wang et al., 2011). The dose-response trend in our findings—that diabetes prevalence increases with shift work duration—is consistent with studies by Pan et al. (2011), who reported that each five-year increment of shift work duration increases diabetes risk by 5–7%.

Short sleep duration (<6 hours), a common consequence of irregular shift schedules, emerged as an independent risk factor in our study, increasing the risk of diabetes by 2.6 times. This supports prior research indicating that reduced sleep leads to increased sympathetic activity, cortisol release, and insulin resistance (Spiegel et al., 2009; Shan et al., 2015). Workers reporting frequent nighttime awakenings or sleep disturbances also exhibited elevated HbA1c levels, echoing the findings by Anothaisintawee et al. (2016), who showed poor sleep quality is associated with worse glycemic control. BMI was another prominent determinant. Participants with a BMI ≥30 were 3.8 times more likely to develop diabetes. This observation is well-documented in the global and regional literature, which identifies obesity as a major modifiable risk factor for type 2 diabetes mellitus (T2DM) due to its role in promoting insulin resistance and systemic inflammation (ADA, 2023; Hu et al., 2001). Obesity in shift workers may also be exacerbated by irregular eating habits, lack of physical activity, and increased caloric intake during night shifts (Esquirol et al., 2009).

Hypertension and a positive family history of diabetes were significantly associated with T2DM in this cohort, consistent with previous research identifying these factors as part of a metabolic syndrome cluster (Grundy et al., 2005). The coexistence of hypertension in one-third of diabetic participants underlines the synergistic nature of cardiovascular and metabolic risks, particularly among middle-aged industrial workers. Our study also noted slight variations in diabetes prevalence by nationality, with Indian workers showing a higher prevalence compared to their Pakistani and other counterparts. This may be attributed to ethnic predispositions, diet, lifestyle, and genetic factors, as prior research has indicated that South Asians have higher visceral adiposity and insulin resistance at lower BMI thresholds (Misra & Khurana, 2011; Ramachandran et al., 2001). Moreover, this group may experience greater occupational and psychological stress due to migration-related socioeconomic pressures (Bhatti et al., 2016).

The observed diabetes prevalence of 26% among our study group exceeds the general prevalence reported in the UAE expatriate population (~18%) (IDF, 2023), emphasizing the occupational burden of industrial work on health. Additionally, the prediabetes rate of 14% suggests an impending public health issue unless early interventions are initiated. Studies in similar Gulf industrial settings report comparable associations. For instance, Al-Rifai et al. (2021) reported that shift workers in Oman had significantly higher fasting glucose and HbA1c levels compared to day workers. Likewise, a cross-sectional study in Saudi Arabia found that 30% of industrial workers had undiagnosed diabetes or prediabetes, with shift work and obesity being the strongest predictors (Alhowikan, 2020).

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Study Limitations

While this study provides valuable insights into the association between shift work, sleep patterns, and the incidence of Type 2 Diabetes Mellitus (T2DM) among industrial workers in the Sharjah Industrial Area, several limitations must be acknowledged. First, the cross-sectional design limits the ability to establish causal relationships between risk factors and the development of diabetes. Longitudinal studies are more suitable for identifying temporal sequences and causality. Second, the study relied partly on self-reported data, especially for sleep duration and sleep quality, which may be subject to recall bias or social desirability bias. Objective sleep measurements such as actigraphy or polysomnography were not feasible in this setting. Third, the study population consisted predominantly of male expatriate workers, which limits the generalizability of the findings to female workers or other occupational sectors within the UAE. Additionally, the lack of data on dietary habits, physical activity levels, and socioeconomic status limits the ability to fully adjust for all potential confounding variables that influence T2DM risk. Lastly, while HbA1c levels were used for diabetes classification, the absence of fasting plasma glucose and oral glucose tolerance tests may have led to underestimation or misclassification of glycemic status in some cases.

Future Research Directions

Future research should aim to adopt a longitudinal cohort design to understand better the causal relationship between shift work, sleep disturbances, and the development of T2DM over time. Incorporating objective measures of sleep quality and circadian rhythm disruptions, such as wearable sleep trackers or melatonin assays, would enhance the reliability of sleep-related data. It is also recommended that future studies consider a more gender-diverse and ethnically varied sample to assess whether the observed associations hold across different demographic groups. Additionally, integrating assessments of physical activity, dietary intake, stress levels, and socioeconomic conditions would provide a more holistic understanding of the multifactorial risks influencing diabetes development. Interventional studies examining the effectiveness of workplace wellness programs—such as structured sleep hygiene education, rotating shift redesign, or glucose monitoring initiatives—would be especially valuable in translating findings into practical policy and occupational health strategies.

CONCLUSION

This study reveals a compelling and statistically significant association between irregular sleep patterns, prolonged shift work exposure, elevated BMI, and the increased prevalence of Type 2 Diabetes Mellitus (T2DM) among industrial workers in the Sharjah Industrial Area. The findings underscore the convergence of occupational, behavioral, and biological risk factors that disproportionately affect this vulnerable population, particularly middle-aged South Asian male expatriates engaged in physically demanding, rotational jobs. Nearly one-third of the participants were either diabetic or pre-diabetic, with HbA1c levels indicating suboptimal glycemic control. Importantly, workers with poor sleep habits and longer shift durations had a markedly higher risk of developing diabetes, even after adjusting for confounders like BMI, hypertension, and family history. These results align with global evidence linking circadian misalignment to metabolic dysfunction, reinforcing the need for urgent workplace interventions focused on optimizing shift schedules, regular screening, and culturally tailored health education. Addressing these modifiable risk factors could significantly improve health outcomes and reduce the burden of non-communicable diseases among industrial labor forces. This study contributes to the growing body of occupational health research advocating for systemic changes in workplace environments to support metabolic health, improve sleep quality, and prevent disease in high-risk populations.

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