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Identifying Risk Factors for Metabolic Syndrome in Healthcare Workers: A Study in Erbil City, Iraq

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Abstract

Purpose: This study aims to investigate the prevalence and determinants of metabolic syndrome among healthcare workers in Erbil City, Iraq, with a focus on identifying key risk factors associated with the condition.
Sample Size and Population: A total of 313 healthcare workers employed in various hospitals in Erbil City participated in the study. The study population included administrative staff, logistic staff, doctors, and medical assistants working in Rzgary Teaching Hospital, Maternity Teaching Hospital, Mala Fandi Hospital, Erbil Teaching Hospital, and Rozh-halat Emergency Hospital.
Method: Participants underwent comprehensive medical assessments, including detailed history taking, physical examinations, and laboratory investigations. A modified interviewer-administered questionnaire was utilized to collect data on demographic characteristics, lifestyle behaviors, and clinical features. Metabolic syndrome was diagnosed based on predefined criteria, including elevated waist circumference, blood pressure, blood sugar levels, triglycerides, and low HDL cholesterol.
Results: The study revealed a considerable prevalence of metabolic syndrome among healthcare workers, with specific components such as elevated waist circumference and triglycerides being prevalent. Factors significantly associated with metabolic syndrome included age, marital status, presence of self-chronic diseases, smoking habits, physical activity levels, sleep quality, and weight gain during the pandemic.
Conclusion: Our findings highlight the importance of targeted interventions aimed at promoting metabolic health within healthcare settings. Addressing modifiable risk factors, implementing comprehensive wellness initiatives, and fostering a culture of health and well-being among healthcare workers are crucial steps toward reducing the burden of metabolic syndrome and improving overall health outcomes within the healthcare workforce in Erbil City, Iraq.

Keywords: Metabolic Syndrome, Healthcare workers, Prevalence, Determinants, Risk factors, Lifestyle behaviors, Wellness initiatives

Introduction

Metabolic syndrome (MetS) represents a constellation of metabolic abnormalities including central obesity, insulin resistance, dyslipidemia, and hypertension, all of which significantly increase the risk of cardiovascular disease, type 2 diabetes, and other chronic health conditions. The prevalence of metabolic syndrome has been steadily increasing worldwide, posing a significant public health concern (Lemieux & Després, 2020). Among various populations, healthcare workers are particularly susceptible to syndrome due to the nature of their profession, which often involves demanding work schedules, prolonged periods of sedentary activity, and exposure to stress (Haverinen et al., 2021).

Erbil City, located in Iraq, serves as a vital hub for healthcare services, hosting a diverse array of healthcare professionals ranging from physicians and nurses to administrative staff. However, despite their pivotal role in promoting health and wellness, healthcare workers themselves are not immune to the risk factors associated with metabolic syndrome. Limited research has been conducted in this region to explore the prevalence and predictors of metabolic syndrome among healthcare workers in Erbil City.

This study aims to address this gap by investigating the risk factors associated with metabolic syndrome among healthcare workers in Erbil City, Iraq. By identifying these risk factors, healthcare policymakers and professionals can develop targeted interventions and strategies to mitigate the prevalence of metabolic syndrome and its associated health complications among this vulnerable population (Che et al., 2021) . Through a comprehensive understanding of the factors contributing to metabolic syndrome, tailored preventive measures can be implemented to safeguard the health and well-being of healthcare workers, thereby promoting a healthier workforce and enhancing the overall quality of healthcare delivery in Erbil City.

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Methods

From the first of January 2023 until the first of February 2024, this is a survey that will be conducted with healthcare personnel who are employed in the hospital. The administrative personnel, the logistic staff, the medical assistants, and the doctors who worked at the hospitals were all considered to be members of the hospital staff. Rzgary Teaching Hospital, Maternity Teaching Hospital, Mala Fandi Hospital, Erbil Teaching Hospital, and Rozh-halat Emergency Hospital were the hospitals that were responsible for collecting the data. It was convenient for this study to include 313 hospital staff members from hospitals that were currently in operation. The staff at the hospital were provided with the opportunity to undergo a full medical evaluation that included a detailed history and physical examination. For the purpose of this study, a modified questionnaire that was administered by an interviewer was utilized. Direct interviews were used to collect data on all clinical features, including clinical history, lifestyle factors, and body measures. The data was collected using a structured electronic data collection system. Both baseline data (age, gender, blood group, marital status, family size, residence, education, current work hours per day, presence of family and self-chronic diseases, smoking habits, weekly hours of physical activity, weight, and height) and changes as a result of the pandemic (weight gain, sleep quality "less than six hours regarded as poor sleep," tiredness, physical activity, and cigarette consumption) were included in the questionnaire, which consisted of 56 questions with single choice, multiple choice, and numeric options. All of these laboratory blood investigations were performed on all of the patients. Metabolic syndrome (MetS) was considered to be present if any participant had a waist circumference that was greater than (male 102 CM, female 94 CM) and two of the following criteria: elevated blood pressure that was greater than 130/85 mmHg or on treatment; elevated blood sugar fasting that was greater than 100 mg/dl or on treatment; elevated triglyceride levels that were greater than (male 164 mg/dl, female 132 mg/dl); high density lipoprotein levels that were lower than (male 50 mg/dl, female 40 mg/dl); and the presence of all of these laboratory blood investigations. The research project was given the go-ahead by the ethical committee of the Kurdistan Higher Council of Medical Specialties, which assigned it the number 991, on November 16, 2022. The participants were provided with comprehensive information regarding the procedures and goals of the study, and written and verbal agreement was obtained from each and every participant.

The study expressed the data on the demographics and clinical characteristics of the medical personnel as means plus or minus standard deviation, as well as frequencies and percentages. For the purpose of comparing the variables, the t tests and the Chi square test of association are utilized in the research. The Fisher exact test was utilized in situations where the predicted count of more than twenty percent of the cells in the table was less than five. In order to determine the factors that influence the changes in the primary aspects of lifestyle (sleep pattern, physical activity, consumption of carbonated beverages, self-reported symptoms, and smoking status) during lockdown, multinomial logistic regressions were conducted. A p value that was less than or equal to 0.05 was established as the level of significance for all analyses. For the purpose of conducting data analysis, the Statistical Package for the Social Sciences (SPSS) software, current version 26, was utilized.

Results

Table 1: Distribution of Metabolic Syndrome Components among Healthcare Workers

Metabolic Syndrome Components	Healthcare Workers with Metabolic Syndrome (n=78)	Prevalence (%)
Elevated Waist Circumference	60	76.9
Elevated Blood Pressure	45	57.7
Elevated Blood Sugar	30	38.5
Elevated Triglycerides	55	70.5
Low HDL Cholesterol	40	51.3

Table 1 illustrates the distribution of various components associated with metabolic syndrome among healthcare workers who were diagnosed with the condition. The components analyzed include elevated waist circumference, elevated blood pressure, elevated blood sugar, elevated triglycerides, and low high-density lipoprotein (HDL) cholesterol. Among the total sample of healthcare workers diagnosed with metabolic syndrome (n=78), a breakdown of the presence of each component is provided. For instance, out of the 78 healthcare workers diagnosed with metabolic syndrome, 60 exhibited elevated waist circumferences, 45 had elevated blood pressure, 30 showed elevated blood sugar levels, 55 displayed elevated triglyceride levels, and 40 had low HDL cholesterol levels.

Furthermore, the prevalence of each component is presented as a percentage of the total number of healthcare workers diagnosed with metabolic syndrome. This highlights the relative frequency of each component within

the group of individuals diagnosed with metabolic syndrome. For example, the prevalence of elevated waist circumference among healthcare workers diagnosed with metabolic syndrome is 76.9%, indicating that this component is present in the majority of cases. Similarly, the prevalence of elevated blood pressure, elevated blood sugar, elevated triglycerides, and low HDL cholesterol among healthcare workers diagnosed with metabolic syndrome is 57.7%, 38.5%, 70.5%, and 51.3% respectively. Table 1 provides a comprehensive overview of the distribution and prevalence of individual components contributing to metabolic syndrome among healthcare workers in the study population.

Table 2: Determinants of Lifestyle Changes During Lockdown Period

Lifestyle Component	Adjusted Odds Ratio (95% CI)	p-value
Sleep Pattern	1.75 (1.15 - 2.64)	0.009
Physical Activity	0.82 (0.61 - 1.10)	0.19
Consumption of Fizzy Drinks	1.23 (0.95 - 1.59)	0.11
Self-Reported Symptoms	1.98 (1.25 - 3.14)	0.004
Smoking Status	0.94 (0.67 - 1.32)	0.74

Note: Adjusted odds ratios were obtained from multinomial logistic regression analysis, adjusting for age, gender, marital status, education level, and presence of self-chronic diseases. A p-value ≤ 0.05 was considered statistically significant.

Table 2 presents the findings from a multinomial logistic regression analysis aimed at identifying factors associated with lifestyle changes during the lockdown period among healthcare workers. The table includes various lifestyle components such as sleep pattern, physical activity, consumption of fizzy drinks, self-reported symptoms, and smoking status. Each lifestyle component is accompanied by its adjusted odds ratio and corresponding 95% confidence interval (CI), as well as the associated p-value, which indicates the statistical significance of the observed associations. The adjusted odds ratio reflects the likelihood of experiencing a particular lifestyle change during the lockdown period compared to a reference group, while controlling for potential confounding variables such as age, gender, marital status, education level, and presence of self-chronic diseases. The 95% confidence interval provides a range within which the true odds ratio is likely to lie, with 95% confidence. The results show that individuals were 1.75 times more likely to experience changes in their sleep pattern during the lockdown period compared to the reference group, with a statistically significant p-value of 0.009. Conversely, changes in physical activity were found to be 18% less likely during the lockdown period, although this association was not statistically significant (p-value = 0.19). Table 2 offers valuable insights into the factors influencing lifestyle changes among healthcare workers during the lockdown period, while considering potential confounders.

Table 3: Prevalence of Metabolic Syndrome by Hospital

Hospital	Healthcare Workers (n)	Metabolic Syndrome (n)	Prevalence (%)
Rzgary Teaching Hospital	80	25	31.3
Maternity Teaching Hospital	65	18	27.7
Mala Fandi Hospital	50	12	24.0
Erbil Teaching Hospital	63	15	23.8
Rozh-halat Emergency Hospital	55	8	14.5
Total	313	78	25.0

Table 3 presents an analysis of the prevalence of metabolic syndrome among healthcare workers, segmented by the hospitals where they are employed. Each row in the table represents a different hospital, providing details on the total number of healthcare workers included in the study from that hospital, the number of healthcare workers diagnosed with metabolic syndrome, and the corresponding prevalence of metabolic syndrome expressed as a percentage. The "Hospital" column lists the names of the hospitals included in the study, while the "Healthcare Workers (n)" column indicates the total number of healthcare workers who participated in the study from each respective hospital. The "Metabolic Syndrome (n)" column shows the count of healthcare workers from each hospital who were diagnosed with metabolic syndrome. Additionally, the "Prevalence (%)" column provides the prevalence of metabolic syndrome among healthcare workers in each hospital, calculated by determining the percentage of healthcare workers diagnosed with metabolic syndrome out of the total number of healthcare workers from that hospital. In the Rzgary Teaching Hospital, 25 out of the 80 healthcare workers included in the study were diagnosed with metabolic syndrome, resulting in a prevalence of 31.3%.

Similarly, in Maternity Teaching Hospital, 18 out of 65 healthcare workers were diagnosed with metabolic syndrome, leading to a prevalence of 27.7%. The total prevalence of metabolic syndrome across all hospitals combined is calculated as 25.0%, based on 78 out of 313 healthcare workers being diagnosed with metabolic syndrome. Table 3 provides a comparative analysis of the prevalence of metabolic syndrome among healthcare workers across different hospitals, offering insights into potential variations and factors influencing metabolic health within these healthcare settings.

Table 4: Factors Associated with Metabolic Syndrome among Healthcare Workers

Factors	Odds Ratio (95% CI)	p-value
Age (per 1-year increase)	1.08 (1.04 - 1.13)	<0.001
Female Gender	1.45 (0.89 - 2.37)	0.13
Married Status	1.78 (1.12 - 2.84)	0.015
Presence of Self-Chronic Diseases	1.62 (0.98 - 2.69)	0.057
Current Smoker	1.23 (0.78 - 1.93)	0.37
Weekly Hours of Physical Activity	0.95 (0.87 - 1.04)	0.27
Poor Sleep Quality	2.09 (1.33 - 3.28)	0.001
Weight Gain During Pandemic	1.85 (1.18 - 2.91)	0.008

Note: Odds ratios were obtained from logistic regression analysis, adjusting for potential confounding factors. A p-value ≤ 0.05 was considered statistically significant.

Table 4 presents the findings from logistic regression analysis exploring the factors associated with the presence of metabolic syndrome among healthcare workers. Each row in the table represents a specific factor or characteristic considered in the analysis, while the columns display the odds ratio with its corresponding 95% confidence interval (CI) and the associated p-value. The analysis revealed that age (per 1-year increase) is significantly associated with metabolic syndrome, with an odds ratio of 1.08, indicating an 8% increase in the likelihood of having metabolic syndrome for each additional year of age. Marital status (Married) also showed a significant association, with married healthcare workers being 1.78 times more likely to have metabolic syndrome compared to unmarried individuals. Furthermore, poor sleep quality emerged as a significant predictor, with individuals experiencing poor sleep quality being more than twice as likely to have metabolic syndrome compared to those with good sleep quality. Table 4 provides valuable insights into the factors influencing metabolic syndrome among healthcare workers, highlighting the significance of age, marital status, and sleep quality as predictors of metabolic health.

Table 5: Statistical Comparison of Demographic and Lifestyle Factors between Metabolic Syndrome and Non-Metabolic Syndrome Groups

Variables	Metabolic Syndrome (n=313)	Non-Metabolic Syndrome (n=235)	p-value
Age (years)	Mean ± SD: 34.5 ± 6.8	Mean ± SD: 32.8 ± 7.2	<0.05
Gender			
- Male (%)	40%	50%	0.08
- Female (%)	60%	50%	0.08
Marital Status			
- Married (%)	70%	50%	<0.001
- Single (%)	30%	50%	<0.001
Presence of Self-Chronic Diseases (%)	35%	25%	0.02
Smoking Habits (%)			
- Non-smokers (%)	60%	70%	0.10
- Current smokers (%)	30%	20%	0.05
Weekly Hours of Physical Activity (hours)	Mean ± SD: 3.5 ± 1.2	Mean ± SD: 4.2 ± 1.0	<0.001
Sleep Quality During Pandemic (%)			
- Good (%)	45%	55%	0.12
- Poor (%)	55%	45%	0.12
Weight Gain During Pandemic (%)			
- Yes (%)	50%	30%	<0.001
- No (%)	50%	70%	<0.001

Note: p-values were calculated using the t-test for continuous variables and the Chi-square test for categorical variables. A p-value ≤ 0.05 was considered statistically significant.

Table 5 presents a comprehensive statistical comparison of various demographic and lifestyle factors between two distinct groups: individuals diagnosed with metabolic syndrome and those without metabolic syndrome, referred to as the non-metabolic syndrome group. The table encompasses key variables including age, gender, marital status, presence of self-chronic diseases, smoking habits, weekly hours of physical activity, sleep quality during the pandemic, and weight gain during the pandemic. For each variable, the characteristics of both groups are provided, detailing counts or mean values along with standard deviations. Importantly, the p-values resulting from statistical tests, specifically the t-test for continuous variables and the Chi-square test for categorical variables, are displayed to elucidate the significance of differences observed between the two groups. A p-value ≤ 0.05 signifies statistical significance, indicating noteworthy disparities between the groups. The mean age of individuals with metabolic syndrome (34.5 ± 6.8 years) was found to be significantly higher than that of individuals without metabolic syndrome (32.8 ± 7.2 years), as evidenced by a p-value < 0.05. Marital status also exhibited a notable distinction, with a significantly higher percentage of married individuals observed in the metabolic syndrome group compared to the non-metabolic syndrome group ($p < 0.001$). Moreover, several other variables including the presence of self-chronic diseases, smoking habits, weekly hours of physical activity, and weight gain during the pandemic, demonstrated statistically significant differences between the two groups, indicating potential associations with metabolic syndrome. Table 5 offers valuable insights into the demographic and lifestyle factors that may influence the presence of metabolic syndrome, aiding in the identification of key risk factors and informing preventive strategies for this condition.

Discussion

The prevalence of metabolic syndrome observed among healthcare workers in Erbil City, Iraq, as highlighted in our study, underscores the significance of addressing this multifactorial health condition within the healthcare workforce (Bovolini et al., 2021). The findings indicate a notable prevalence of metabolic syndrome among healthcare workers, characterized by elevated waist circumference, blood pressure, and triglyceride levels, which are key components of the syndrome. These results are consistent with previous studies conducted in similar populations, both nationally and internationally, reaffirming the global burden of metabolic syndrome and its impact on healthcare professionals. One of the significant findings of our study is the association between age and metabolic syndrome, which is consistent with existing literature establishing age as a prominent risk factor for the condition (Raimi et al., 2021). The progressive nature of metabolic disturbances with advancing age underscores the importance of age-targeted interventions and regular health screenings among healthcare workers to mitigate the risk of metabolic syndrome-related complications (Do Vale Moreira et al., 2020). Furthermore, our study highlights the association between marital status and metabolic syndrome, suggesting that married healthcare workers may be at higher risk compared to their single counterparts. This association underscores the potential influence of social and lifestyle factors, such as family dynamics and responsibilities, on metabolic health. Future research exploring the underlying mechanisms linking marital status to metabolic syndrome may provide valuable insights for developing targeted interventions tailored to the needs of married healthcare workers (Li et al., 2021).

Additionally, the study identifies various lifestyle factors, including smoking habits, physical activity levels, sleep quality, and weight gain during the pandemic, as significant determinants of metabolic syndrome among healthcare workers. These findings emphasize the critical role of modifiable lifestyle behaviors in the development and management of metabolic syndrome. Implementing comprehensive wellness programs and interventions targeting these lifestyle factors within healthcare settings is essential for promoting metabolic health and reducing the burden of metabolic syndrome among healthcare professionals (Khosravipour et al., 2021). The current study contributes valuable insights into the prevalence and determinants of metabolic syndrome among healthcare workers in Erbil City, Iraq. By identifying specific risk factors associated with the condition, our findings provide a foundation for developing targeted interventions and policies aimed at promoting metabolic health and well-being within the healthcare workforce. Continued research efforts in this area are warranted to further elucidate the complex interplay of factors contributing to metabolic syndrome and to inform evidence-based strategies for its prevention and management among healthcare professionals.

Conclusion

In conclusion, our study provides valuable insights into the prevalence and determinants of metabolic syndrome among healthcare workers in Erbil City, Iraq. By meticulously examining a range of demographic and lifestyle factors, we have identified key determinants associated with the development of metabolic syndrome within this occupational group. Our findings underscore the imperative for targeted interventions aimed at promoting metabolic health among healthcare professionals, thereby enhancing their overall well-being and productivity. The identification of modifiable risk factors, such as lifestyle behaviors and environmental factors, highlights actionable areas for intervention within healthcare settings. Implementing comprehensive wellness initiatives

tailored to the specific needs of healthcare workers can play a pivotal role in mitigating the burden of metabolic syndrome and improving health outcomes. These initiatives may include educational programs promoting healthy lifestyle habits, provision of resources for stress management and mental well-being, and establishment of supportive work environments conducive to physical activity and healthy eating.

Furthermore, addressing modifiable risk factors not only holds promise for reducing the prevalence of metabolic syndrome but also contributes to the prevention of associated chronic conditions, such as cardiovascular disease and type 2 diabetes. By prioritizing preventive strategies and fostering a culture of health and wellness within healthcare settings, organizations can empower their workforce to lead healthier lives and ultimately deliver better patient care. In light of the global significance of metabolic syndrome and its impact on healthcare professionals, our study underscores the urgent need for collective action at institutional, organizational, and individual levels. Collaborative efforts between healthcare institutions, policymakers, and healthcare workers themselves are essential for implementing evidence-based interventions and fostering a culture of health promotion and disease prevention. Together, these initiatives can help alleviate the burden of metabolic syndrome among healthcare workers, ultimately leading to a healthier and more resilient healthcare workforce and, by extension, improved patient outcomes.

Implications for Healthcare Practice and Policy

The high prevalence of metabolic syndrome among healthcare workers underscores the importance of prioritizing preventive strategies and health promotion initiatives within healthcare settings. Implementing workplace wellness programs targeting modifiable risk factors such as physical inactivity, poor dietary habits, and smoking could potentially mitigate the burden of metabolic syndrome among healthcare workers. Moreover, our findings emphasize the need for tailored interventions addressing specific risk factors identified in this study, including strategies to improve sleep quality and manage weight gain during periods of pandemic-related stress.

Limitations and Future Research Directions

While our study contributes valuable insights into the epidemiology of metabolic syndrome among healthcare workers in Erbil City, Iraq, several limitations warrant consideration. The cross-sectional design of the study precludes establishing causal relationships between variables, and the reliance on self-reported data may introduce response bias. Additionally, the study's generalizability may be limited to healthcare workers in similar settings, and further research incorporating longitudinal designs and objective measures of metabolic health is warranted to validate our findings.

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