ORIGINAL ARTICLE

CARDIOVASCULAR RISK ASSESSMENT AMONG HEALTHCARE WORKERS IN DISTRICT MARDAN USING THE QRISK2 CALCULATOR: A MULTICENTER CROSS-SECTIONAL STUDY

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Objectives: This study aimed to evaluate the cardiovascular disease risk among healthcare workers in Mardan, Pakistan, utilizing the QRISK2 calculator.

Methodology: A multicenter cross-sectional study was conducted in four major hospitals of Mardan from August to October 2023. The study employed proportionate stratified sampling, with sample size determination through openepi.com. Data collection utilized a self-prepared proforma, and laboratory investigations were conducted at Mardan Medical Complex. IBM-SPSS 22 and Microsoft Excel 365 were used for data analysis, employing mean, standard deviation, frequency, percentage, chi-square test, and independent sample T-test for different variables.

Results: The study included 246 participants (153 males, 93 females), comprising 63 doctors, 98 nurses, and 85 paramedics, with a mean age of 36 ± 9.1 years. The overall cardiovascular disease risk among healthcare workers was 3.94 ± 6.3%. DHQ Mardan healthcare workers exhibited the highest cardiovascular risk at 4.8%, followed by THQ Takhtabhai (3.7%), Mardan Medical Complex (0.8%), and Type-D Hospital Katlang (0%). Paramedics had the highest CVD risk at 5.9%, followed by doctors with 1.6%, and nurses showed no cases of high CVD risk. Gender-based analysis indicated a statistically significant higher CVD risk in male healthcare workers compared to females (p-value = 0.001).

Conclusion: Healthcare workers in district Mardan have a lower risk of developing cardiovascular disease overall. However, CVD risk is higher in DHQ Hospital compared to other hospitals. Paramedics have a higher risk than doctors and nurses. Male healthcare workers are at a higher risk compared to females.

Keywords: Cardiovascular Risk; Healthcare Workers; QRISK2; District Mardan

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INTRODUCTION

Cardiovascular diseases (CVDs) encompass a wide array of conditions affecting the heart and blood vessels, including but not limited to coronary heart disease, stroke, and peripheral arterial disease.[1] These conditions can manifest with varying degrees of severity and may present with symptoms or remain asymptomatic.[2] CVDs pose a significant global health burden, contributing to millions of deaths annually across different regions.[3]

In 2020, Eastern Europe and Central Asia reported the highest rates of CVD-related deaths, followed by several other regions including Oceania, North Africa, the Middle East, and parts of Asia.[4] Conversely, regions such as Western Europe, Australasia, and North America exhibited lower rates of CVD mortality.[5] Tools like the QRISK2 calculator have been developed to predict the likelihood of experiencing a cardiovascular event, such as a heart attack or stroke, over a 10-year period.[6] Despite its utility, there have been debates regarding its usage, with recommendations against its widespread adoption in certain healthcare systems.

Within the context of South Asia, CVDs are a significant contributor to mortality, with millions of deaths attributed to these conditions every year. Pakistan, like many other countries in the region, faces

the challenge of a "double burden of disease," characterized by the coexistence of communicable and non-communicable diseases.[7] The prevalence of CVDs in South Asia has been steadily increasing over the years, highlighting the urgent need for effective prevention and management strategies.[8]

Healthcare workers (HCWs), including doctors, nurses, and paramedics, play a crucial role in the frontline defense against various health threats, including CVDs.[9] However, the nature of their work exposes them to unique risk factors, such as high levels of stress, irregular working hours, and occupational hazards, which may predispose them to CVDs.[10] Despite their pivotal role in promoting health, there is limited data on the cardiovascular health of HCWs, particularly in regions like District Mardan.

This study aims to fill this gap by assessing the cardiovascular disease risk among HCWs in District Mardan using the QRISK2 calculator. By categorizing HCWs into low, moderate, and high-risk groups, we seek to identify individuals who may benefit from targeted interventions aimed at reducing their risk of developing CVDs. This research is essential not only for understanding the prevalence of CVDs among HCWs but also for informing strategies to safeguard their health and well-being, thereby ensuring their continued ability to deliver quality healthcare services.

METHODOLOGY

Study Design: This multi-center descriptive cross-sectional study was designed to assess CVD risk factors among healthcare workers in four major hospitals of District Mardan.

Setting: The study was conducted from August to October 2023 at Mardan Medical Complex, DHQ Hospital Mardan, THQ Hospital Takhtabhai, and Type D Hospital Katlang.

Participants: Healthcare workers aged 25 to 60 years currently employed in the aforementioned hospitals were included in the study. Individuals with a known history of cardiovascular disease or other comorbidities such as cancer and chronic liver disease were excluded.

Variables: Demographic variables (gender, age, marital status, ethnicity, healthcare worker status), CVD risk factors (smoking status, blood pressure, diabetes, chronic kidney disease, family history of heart disease, physical activity), and biophysiological measures (blood pressure, height, weight, body mass index, biochemical tests for urea, creatinine, HDL, LDL, triglycerides, and cholesterol) were assessed.

Data Sources/Measurement: Data were collected using a self-designed questionnaire modified from the QRISK2 calculator. Biomedical investigations such as total cholesterol level, LDL, HDL, and triglycerides were conducted at the laboratory of Mardan Medical Complex.

Bias: Efforts were made to minimize bias through the use of proportionate-stratified sampling technique, obtaining ethical approval from the Institutional Review Board (IRB), and ensuring informed consent from all participants.

Study Size: The sampling size was calculated using openepi.com, resulting in a total sample size of 246 individuals from a population of 1015 healthcare workers.

Quantitative Variables: Continuous variables such as age, height, weight, blood pressure, total cholesterol level, cholesterol/HDL ratio, urea, and creatinine level were analyzed using mean and standard deviation.

Statistical Methods: Frequency and percentage were used for categorical variables, while the Chi-square test was employed to analyze categorical variables such as QRISK2 score categories, marital status, smoking status, healthcare workers' status, and diabetes status. An Independent Sample T-test was utilized to assess the statistical difference in QRISK2 scores based on various independent variables such as gender and family history. A significance level of 0.05 was employed, corresponding to a confidence level of 95%, with a margin of error set at 5%. IBM SPSS 22 software and Microsoft Excel 365 were utilized for data analysis.

RESULTS

Participants: The study included 246 healthcare workers with an average age of 36 years (± 9.1). Among them, 122 (49.6%) were from Mardan Medical Complex, 83 (33.7%) from DHQ Hospital Mardan, 27 (11%) from THQ Takhtabhai, and 14 (5.7%) from Type D Hospital Katlang. The healthcare workers comprised 63 doctors (25.6%), 98 nurses (39.8%), and 85 paramedic staff (34.6%). The gender distribution showed that 153 participants (62.2%) were male and 93 (37.8%) were female (Table 1).

Table 1: Socio-demographic characteristics

Baseline Characteristics	Summary
Total (N)	**246**
Mean Age (years)	36 ± 9.1
Hospitals	
Mardan Medical Complex	122 (49.6%)
DHQ Mardan	83 (33.7%)
THQ Takhtabhai	27 (11%)
Type D Hospital Katlang	14 (5.7%)
Health Care Workers Status	
Doctors	63 (25.6%)
Nurses	98 (39.8%)
Paramedics	85 (34.6%)
Gender	
Male	153 (62.2%)
Female	93 (37.8%)
Marital Status	
Single	65 (26.4%)
Married	177 (72%)
Widowed	4 (1.6%)
Height in Centimeter (cm)	168.3 ± 10.6
Weight in Kilogram (kg)	71.3 ± 13.2
Body Mass Index (kg/m^2)	25.3 ± 4.5

Descriptive Data: The study population exhibited various demographic and health characteristics. Most participants were married (72%) and had a mean height of 168.3 cm (± 10.6) and a mean weight of 71.3 kg (± 13.2), resulting in a mean BMI of 25.3 kg/m² (± 4.5). Approximately 30.5% had a positive family history of CVD, while the majority were non-smokers (89.8%) and had no history of diabetes (94.3%). Physical activity levels varied, with 26.4% leading a sedentary lifestyle, 43.9% engaging in moderate activity, and 29.7% being actively engaged. BMI categories ranged from underweight (3.3%) to obese (15.0%).

Biophysiological measures indicated a mean systolic blood pressure of 122.98 mmHg (± 13.0), a mean diastolic blood pressure of 79.45 mmHg (± 7.5), and mean levels for total cholesterol (185.83 mg/dl ± 71.7), HDL (47.53 mg/dl ± 12.7), LDL (106.87 mg/dl ± 27.9), triglycerides (181.13 mg/dl ± 83.2), and cholesterol/HDL ratio (4.04 ± 1.3) (Table 2).

Outcome Data: The participants' overall cardiovascular risk ranged from 0.1% to 38%, with a mean of 3.94% (± 6.3). Most healthcare workers were classified as low risk (89.4%), followed by moderate risk (8.1%) and high risk (2.4%). The distribution of risk varied among hospitals, with Mardan Medical Complex having the highest proportion of low-risk individuals (98.4%) and Type D Hospital Katlang having the highest proportion of intermediate-risk individuals (35.7%).

Main Results: Significant associations were found between CVD risk and hospital ($p < 0.001$), gender ($p < 0.001$), HCW status ($p = 0.02$), smoking status ($p < 0.001$), diabetes status ($p < 0.001$), and family history of heart disease ($p = 0.06$). Male HCWs had a significantly higher QRISK2 score compared to females (5.09% vs. 2.05%, $p < 0.001$), and those with a positive family history of CVD tended to have a higher mean QRISK2 score compared to those with a negative family history (5.06% vs. 3.45%, $p = 0.06$) (Table 3).

Table 2: Cardiovascular Risk Factors of Healthcare Workers

CVD risk factors	Summary
Total (N)	**246**
Family history	
Yes	75 (30.5%)
No	171 (69.5%)
Smoking Status	
Non-smoker	221 (89.8%)
Ex-smoker	10 (4.1%)
Light smoker	14 (5.7%)
Moderate smoker	1 (0.4%)
Diabetes History	
None	232 (94.3%)
Type 1	2 (0.8%)
Type 2	12 (4.9%)
Physical activity	
Sedentary lifestyle	65 (26.4%)
Moderate Activity	108 (43.9%)
Active	73 (29.7%)
BMI (kg/m^2) Categories	
<18.5	8 (3.3%)
18.5 to 24.9	118 (48.0%)
25.0 to 29.9	83 (33.7%)
30.0 to 40.0	37 (15.0%)
Systolic BP (mmHg)	122.98 ± 13.0
Diastolic BP (mmHg)	79.45 ± 7.5
Total Cholesterol Level (mg/dl)	185.83 ± 71.7
HDL Level (mg/dl)	47.53 ± 12.7
LDL Level (mg/dl)	106.87 ± 27.9
Triglyceride Level (mg/dl)	181.13 ± 83.2
Cholesterol/HDL Ratio	4.04 ± 1.3

BMI = Body Mass Index, BP = Blood Pressure, HDL = High Density Lipoprotein, LDL = Low Density Lipoprotein

DISCUSSION

Our study aimed to assess cardiovascular risk factors and categorize HCWs into low, intermediate, and high-risk groups using the QRISK2 calculator. We enrolled 246 participants, including 153 males and 93 females, with an average age of 36±9.1 years. Males exhibited a higher risk (3.9%) compared to females, with a statistically significant difference (p-value = 0.001). Among the HCWs, there were 63 doctors, 98 nurses, and 85 paramedics selected from various hospitals in Mardan, including Mardan Medical Complex, DHQ Hospital Mardan, THQ Hospital Takhtabhai, and Type D Hospital Katlang.

Table 3: Risk of Cardiovascular Diseases among Healthcare Workers Based on QRISK2 Score

	Total	Risk of CVD in HCWs (%)			P-Value
		Low < 10%	Intermediate 10% to <20%	High > 20%	
Hospital					
MMC	122	98.4	0.8	0.8	0.001
DHQ Mardan	83	84.3	10.8	4.8	
THQ Takhtabhai	27	77.7	18.5	3.7	
Type D Hospital Katlang	14	10.8	5.9	0	
Gender of the HCWs					
Male	153	98.5	11.8	3.9	0.001
Female	93	97.8	2.2	0	
Healthcare workers' status					
Doctors	63	88.8	9.5	1.6	0.02
Nurses	98	95.9	4.1	0	
Paramedics	85	82.4	11.8	5.9	
Marital status of the HCWs					
Single	65	5.9	1.5	0	0.07
Married	177	85.9	10.7	3.4	
Widowed	4	100	0	0	
Smoking Status of the HCWs					
Non-smoker	221	92.3	5.9	1.8	0.001
Ex-smoker	10	80	20	0	
Light smoker	14	50	35.7	14.3	
Moderate smoker	1	100	0	0	
Diabetes status of the HCWs					
None	232	92.7	6.5	0.9	0.001
Type 1	2	50	0	50	
Type 2	12	33.3	41.7	25	
Family History of Heart Disease					
Yes	75	89.3	8	2.7	0.06
No	171	86.4	7.9	2.3	

DHQ Hospital Mardan showed the highest cardiovascular risk at 4.3%. The average QRISK2 score was 3.94 ± 6.27, with 89.4% classified as low risk, 8.1% as moderate risk, and 2.4% as high risk.

Comparing our findings to previous studies, our study reported a lower cardiovascular disease (CVD) risk of 3.94%, contrasting with higher risks reported in studies conducted in Nigeria (40%)[10-13] and Saudi Arabia (95.4%).[14] The distribution of male and female participants correlated with studies conducted in Lahore and Turkey, reflecting variations attributable to study location and design.[15] The average age of participants in our study was similar to studies conducted in India and Nigeria, indicating a consistency in the adult age category among participants across regions.[16,17]

Regarding risk factors, our study found a higher prevalence of positive family history compared to previous studies, while smoking habits and diabetes prevalence were lower. Physical activity levels and BMI distribution were consistent with some studies but differed from others.[18] Males exhibited a higher risk than females, consistent with previous findings,[19] as did light smokers and participants with type 1 diabetes or a positive family history. Paramedic staff showed a higher risk compared to doctors and nurses in our study, contrasting with findings from previous studies where doctors exhibited the highest risk.[20] These variations underscore the importance of contextual factors in assessing cardiovascular risk among HCWs.

LIMITATION

The study was restricted to healthcare workers in District Mardan, which may limit the generalizability of the findings to the broader population. Future research incorporating a more diverse sample from multiple regions could provide a more comprehensive understanding of cardiovascular disease risk factors and prevalence.

CONCLUSION

This study concludes that the overall cardiovascular disease (CVD) risk among healthcare workers in District Mardan, KP, was found to be low. However, several key findings warrant attention: Males exhibited a higher risk of developing CVD compared to females, indicating a gender disparity in cardiovascular health outcomes. Paramedics demonstrated a higher risk of CVD compared to doctors and nurses, highlighting the need for targeted interventions tailored to specific healthcare professions. Healthcare workers at District Head

Quarter Hospital were identified as being at higher risk compared to other hospitals, such as Mardan Medical Complex, Tehsil Head Quarter Hospital Takhtabhai, and Type D Hospital Katlang. This suggests the importance of implementing targeted preventive measures and interventions within specific healthcare settings to mitigate cardiovascular risk factors and improve overall cardiovascular health outcomes.

AUTHORS' CONTRIBUTION

SLAS, HA, SH and SAU: Concept and design, data acquisition, interpretation, drafting, final approval, and agree to be accountable for all aspects of the work.

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