

ORIGINAL ARTICLE

## Exploring the Prevalence of Cardiovascular Risk Factors Among Healthcare Workers.

Benjamin Champ Thomas<sup>1,2</sup>, Maryam Zainal<sup>1</sup>, Mohd Jaamia Qadir Mohd Badrin<sup>1</sup>, Nurkhairul Bariyah Baharun<sup>1\*</sup>

<sup>1</sup>Faculty of Health Sciences, Universiti Selangor, Shah Alam, Selangor, Malaysia.

<sup>2</sup>Pejabat Kesihatan Daerah Segamat

### Corresponding Author

Nurkhairul Bariyah Baharun

Faculty of Health Sciences, Universiti Selangor, Shah Alam, Selangor, Malaysia.

Email: [nurkhairun@unisel.edu.my](mailto:nurkhairun@unisel.edu.my)

Submitted: 20/03/2024. Revised edition:03/05/2024. Accepted: 09/05/2024. Published online: 01/06/2024.

### Abstract

Cardiovascular disease stands as the foremost cause of mortality worldwide. Multiple physiologic factors such as obesity, hypertension, hyperlipidaemia, and hyperglycaemia are strongly associated with the increased risk of developing cardiovascular diseases. Healthcare professionals are susceptible to cardiovascular disease due to lifestyle and occupational factors. This study aims to determine the prevalence of cardiovascular disease risk factors among healthcare workers in Pejabat Kesihatan Daerah Segamat (PKD Segamat). A retrospective quantitative study was conducted by obtaining data measurements of height, weight, blood pressure, fasting blood glucose, cholesterol, and triglyceride levels of 378 healthcare workers. The workforce was categorized into management & professional, executor, and administrative & support groups. Only 11.9% of healthcare workers were considered healthy, whereas the majority (35.7%) had at least one cardiovascular disease risk factor. Obesity was prevalent at 33.3%, with systolic hypertension at 3.2% , diastolic hypertension at 2.9% , hyperglycaemia at 4.5%, hypercholesterolemia at 55% and hypertriglyceridemia at 14%. The prevalence of the risk factors investigated was higher in males, those aged 41 – 50 and 51 – 60, and healthcare workers in the administrative & support group. The results imply that the prevalence of obesity and hypercholesterolaemia are high among healthcare workers of PKD Segamat. Screening programs, preventative measures and policies must be developed and applied urgently to ensure a healthy workforce within the organization.

**Keywords:** *Cardiovascular disease risk factors; healthcare workers; prevalence.*

## Introduction

Stroke is the second most common cause of mortality and the third most common cause of death and disability, combined globally [1]. The prevalence of cardiovascular disease in Malaysia has risen since 1996 [2]. The latest National Health Morbidity Survey by the Ministry of Health Malaysia found that 50.1% of Malaysians are obese, 30% have hypertension, 38.1% have hyperlipidemia, and 18.3% have diabetes [3]. The Malaysian government has responded by launching a national plan to tackle non-communicable diseases like cardiovascular disease [4]. Certain physiological factors, such as hypertension, hyperlipidaemia, and hyperglycaemia, can impact the progression and severity of cardiovascular disease. However, reducing them can reduce the risk of cardiovascular disease [5]. Studies have shown that healthcare workers face a higher risk of developing cardiovascular diseases due to occupational factors such as shift work and stress [6]. The health and productivity of healthcare workers are negatively impacted by risk factors like obesity and hypertension, which may limit their ability to perform their tasks. An unhealthy workforce not only reduces productivity but also strains an organisation's resources. Even the National Audit Department has acknowledged the understaffing of most Ministry of Health facilities [7]. Hence, studying the prevalence of cardiovascular disease risk factors among healthcare workers in PKD Segamat, including obesity, hypertension, hyperlipidaemia, and hyperglycaemia, is crucial to prevent these diseases. A retrospective study was conducted to determine the prevalence of these risk factors and to compare their distribution by gender, age, and occupation.

## Materials and methods

### *Study design, location and sampling*

A cross-sectional study was conducted to evaluate the prevalence of cardiovascular disease risk factors among healthcare workers at PKD

Segamat. Data on height, weight, blood pressure measurement, fasting blood glucose, fasting blood cholesterol, and fasting blood triglyceride of 378 healthcare workers were obtained through random sampling from the PKD Segamat Staff Screening Database from January to October 2021.

### *Inclusion and exclusion criteria*

This study exclusively analysed data from permanent and contract healthcare workers in PKD Segamat with over three months of service. Those who were temporarily or permanently suspended, undergoing clinical attachments, those with less than three months of service, were on unpaid leave for more than three months, resigned before January 2021, or underwent health screening at non-affiliated facilities were excluded to streamline data collection.

### *Data classification and analysis*

The values for BMI, systolic and diastolic blood pressure, fasting blood glucose, fasting blood cholesterol, and fasting blood triglyceride were categorised based on the Malaysian Clinical Practice Guidelines. A BMI  $\geq 27.5$  kg/m<sup>2</sup> was categorised as obese. Systolic blood pressure readings  $\geq 140$  mmHg or diastolic readings  $\geq 90$  mmHg were categorised as hypertension. A fasting blood glucose level  $\geq 7.0$  mmol/L was categorised as hyperglycaemia. A fasting cholesterol level  $\geq 5.2$  mmol/L was classified as hypercholesterolaemia, while as hypertriglyceridaemia if fasting triglyceride levels  $\geq 1.7$  mmol/L. The healthcare workers were divided into three occupational groups: management & professional, executor, and administrative & support, as illustrated in Table 1.

The BMI, systolic and diastolic blood pressure, fasting blood glucose, fasting blood cholesterol, and fasting blood triglyceride values were used to compare the distribution among gender, age groups and occupational groups. Prior to analysis, the normality of the sample population was

assessed using the Kolmogorov-Smirnov test. Given the non-parametric nature of the data, the Mann-Whitney U test was employed to compare the distribution of these values between genders. Similarly, the Kruskal-Wallis test was utilized to examine differences in distribution across age and occupational groups. All tests were performed using the SPSS Software, and a significant level of  $p < 0.05$  was used for all statistical tests.

#### *Ethical approval*

This study was registered with the National Medical Research Register (NMRR-21-1850-61414) and received approval from the Medical Research and Ethics Committee.

## **Results**

### ***Sample demographic and population***

A total of 378 healthcare workers from the Pejabat Kesihatan Daerah Segamat who met the inclusion criteria were included in the study. Among the occupational groups, the largest group was the executor group with 235 participants (62.2%), followed by the management and professional group with 79 (20.9%) and the administrative and support group with 64 (16.9%). Most participants were female, comprising 282 (74.6%) compared to 96 (25.4%) males. Most of the healthcare workers were Malay, accounting for 326 (86.2%), followed by Indian with 28 (7.4%) and Chinese with 17 (4.5%). Other ethnicities, such as Kadazan, Bidayuh, Iban, Melanau, Dusun and Orang Asli, represented a small number, with only 7 participants (2.5%). The majority of the participants, 169 (44.7%), were aged 31-40, followed by 111 (29.4%) aged 21-30, 78 (20.6%) aged 41-50, and 20 (5.3%) aged 51-60.

### ***Prevalence of cardiovascular disease risk factors among healthcare workers in PKD Segamat***

The study's findings indicated a high prevalence of cardiovascular disease risk factors among healthcare workers in PKD Segamat, with 33.3%

of workers being obese, 55.2% having hypercholesterolemia, and 14% having hypertriglyceridemia. The prevalence of systolic hypertension was 3.2%, diastolic hypertension was 2.9%, and hyperglycemia was 4.5%. Regarding the prevalence of cardiovascular disease risk factors by gender, males had a higher prevalence of all the studied risk factors than females. The Mann-Whitney U test revealed significant differences between genders for systolic and diastolic blood pressure, fasting blood cholesterol, and fasting blood triglyceride as shown in Table 3. Table 4 displays the prevalence of cardiovascular disease risk factors among the age groups, revealing higher prevalence rates in the older age groups of 41–50 and 51–60. There is a significant difference in BMI, blood pressure, fasting blood glucose and triglyceride values among the age groups. Table 5 demonstrates the prevalence of cardiovascular disease risk factors among the different occupational groups in this study. Among occupational groups, there was a significant difference in BMI, blood pressure, fasting blood glucose, and triglyceride values. This study investigated six cardiovascular disease risk factors among healthcare workers, including obesity, hypertension, hyperglycaemia, hypercholesterolaemia, and hypertriglyceridaemia, using readings of BMI, blood pressure, glucose, cholesterol, and triglyceride levels. The results showed that only 11.9% of healthcare professionals were considered healthy, whereas 35.7% showed at least one risk factor. Furthermore, 31% had two risk factors, 13% had three, 5.6% had four, 2.6% had five, and 0.3% had all six risk factors as shown in Table 6.

## **Discussion**

The prevalence of obesity among healthcare workers in this study was higher than the results reported by Hazmy H et al (2015) [8]. The high rate of hypercholesterolemia (55.2%) was also higher than the national average of 38.1% found

in the National Health and Morbidity Survey of 2019 [3]. The findings suggest that healthcare workers in PKD Segamat may have unhealthy lifestyles, including sedentary behaviour and poor dietary habits. Occupational factors such as long working hours, increased workload, and stress, as suggested by Eline S van der Valk et al (2018) [9], may also contribute to the increased risk of obesity and hyperlipidemia among these workers. The findings of this study also shows that males had a higher prevalence of all the studied risk factors than females. Similar trends were observed in studies from Iran and Pakistan, where males had a higher prevalence of cardiovascular risk factors compare to female [10].[11]. This disparity may be due to physiological differences such as body composition, hormone levels, and metabolic rates between genders, as Naghavi M et al (2017) [12] suggested.

Obesity is a significant concern among the 41–50 age group, with a prevalence 50% higher than that of the general population in the same age group. Similarly, the prevalence of hypercholesterolaemia at 75% among those aged 51–60 is concerning. The trends of hyperglycaemia, hypercholesterolaemia and hypertriglyceridaemia increasing with age are consistent with the findings of the NHMS 2019 [3]. Age-related hormonal, functional, and capacity changes can affect cardiac function and circulation, leading to a higher risk of cardiovascular diseases [13] The decline in cardiac capacity and the progression of chronic diseases also impact the functioning of other organs, putting those aged at a higher risk of cardiovascular disease [14].

The highest prevalence of obesity (46.9%) and systolic hypertension (10.9%) was found among the administrative & support group, which is higher than that reported in studies conducted in England, Taiwan, and South Africa [15]. The highest prevalence of hypercholesterolemia (57.4%) was found among the executor group. Occupational factors such as shift work, long

hours, and education level affect cardiovascular disease risk [16]. Healthcare workers from the administrative & support group were also found to have the highest risk of cardiovascular disease in similar studies done in Singapore and Taiwan [17]. Healthcare workers in the administrative & support group may lack medical knowledge, which can cause them to overlook essential information for managing cardiovascular disease and its risk factors. The deskbound nature of their job may also be a contributing factor.

## Conclusion

The results of this study indicate that a high prevalence of healthcare workers at Pejabat Kesihatan Daerah Segamat being at risk for cardiovascular disease, with 35.7% displaying one or more risk factors and only 11% considered healthy. The prevalence of hypercholesterolaemia was higher among healthcare workers, with higher rates among males, those aged 41-60, and those in the administrative and support occupational group. Further research is needed to investigate modifiable lifestyle and other factors contributing to the increased risk of cardiovascular disease. To address this issue, the Health Ministry and relevant organisations should prioritise implementing educational programs and policies promoting a healthy lifestyle among healthcare workers. Screening programs and preventative measures should also be developed to ensure a healthy workforce. Additionally, the implementation of screening and intervention programs should also be expanded to better detect and manage these conditions.

## Acknowledgement

Pejabat Kesihatan Daerah Segamat and Universiti Selangor.

## Competing interest

None

Table 1. Classification of occupational groups of healthcare workers

<b>Classification of Occupational Groups</b>	<b>Occupation</b>
Management & Professional Group (Kumpulan Pengurusan & Profesional)	Medical Officer, Medical Specialist, Optometrists, Dentist, Pharmacist, Dietician.
Executor Group (Kumpulan Pelaksana)	Medical Assistant, Nurse, X-Ray Technician, Medical Laboratory Technician, Attendant, Occupational Therapist, Physiotherapist, Dental Therapist, Public Health Assistant, Health Inspector.
Administrative & Support Group (Kumpulan Pentadbiran & Sokongan)	Clerk, Accountant, Drivers, Office Assistant.

Table 2. Overall prevalence of cardiovascular disease risk factors among healthcare workers

Cardiovascular Disease Risk Factors	%
Obesity	33.3%
Systolic Hypertension	3.2%
Diastolic Hypertension	2.9%
Hyperglycaemia	4.5%
Hypercholesterolaemia	55.2%
Hypertriglyceridaemia	14%

Table 3. Prevalence of cardiovascular disease risk factors among gender

Cardiovascular Disease Risk Factors	Male % (Mean Rank)	Female % (Mean Rank)	Mann Whitney U Test <i>p</i> -value
Obesity	34.4% (193.63)	33% (188.10)	.67
Systolic Hypertension	4.2% (234.63)	2.8% (174.14)	<.001
Diastolic Hypertension	3.1% (221.54)	2.8% (178.59)	<.001
Hyperglycaemia	6.3% (198.51)	3.9% (186.43)	.35
Hypercholesterolaemia	61.4% (209.03)	53.2% (182.85)	.04
Hypertriglyceridaemia	31.3% (247.91)	8.2% (169.92)	<.001

Table 4. Prevalence of cardiovascular disease risk factors among the different age groups

Cardiovascular Disease Risk Factors	21 – 30 % (Mean Rank)	31 – 40 % (Mean Rank)	41 – 50 % (Mean Rank)	51 – 60 % (Mean Rank)	Kruskal Wallis <i>p</i> -value
Obesity	21.6% (152.85)	33.1% (192.12)	50% (230.65)	35% (210.35)	<.001
Systolic Hypertension	0% (168.92)	2.4% (183.77)	7.7% (217.26)	10% (243.85)	.002
Diastolic Hypertension	0% (173.76)	4.1% (181.49)	1.3% (212.02)	15% (256.73)	.003
Hyperglycaemia	1.8% (146.54)	3.6% (188.89)	10.3% (240.85)	5% (232.83)	<.001
Hypercholesterolaemia	57.6% (191.15)	53.9% (182.72)	50% (187.63)	75% (244.93)	.12
Hypertriglyceridaemia	10.8% (161.66)	13% (192.48)	14.1% (204.45)	40% (260.55)	<.001

Table 5. Prevalence of cardiovascular disease risk factors among the different healthcare occupational groups

Cardiovascular Disease Risk Factors	Management & Professional Group % (Mean Rank)	Executor Group % (Mean Rank)	Administrative & Support Group % (Mean Rank)	Kruskal Wallis <i>p</i> -value
Obesity	15.2% (138.82)	35.7% (199.06)	46.9% (216.98)	<.001
Systolic Hypertension	0% (156.12)	2.1% (186.63)	10.9% (241.26)	<.001
Diastolic Hypertension	1.3% (166.84)	1.7% (185.36)	9.4% (232.66)	.001
Hyperglycaemia	1.3% (160.63)	3.8% (193.54)	10.9% (210.30)	.02
Hypercholesterolaemia	50.6% (177.35)	57.4% (192.58)	53.1% (193.19)	.54
Hypertriglyceridaemia	8.9% (165.17)	11.9% (187.28)	28.1% (227.68)	.003

Table 6. The number of risk factors experienced by healthcare workers individually.

Number of risk factor(s)	Frequency(N)	Percentage (%)
0	45	11.9
1	135	35.7
2	117	31.0
3	49	13.0
4	21	5.6
5	10	2.6
6	1	.3
Total	378	100.0

## References

- [1]. Feigin VL, Brainin M, Norrving B, Martins S, Sacco RL, Hacke W, Fisher M, Pandian J LP. World Stroke Organization (WSO): Global Stroke Fact Sheet 2022. *J Stroke*. 2022;17(1):18–29.
- [2]. Selvarajah S, Haniff J, Kaur G, Hiong TG, Cheong KC, Lim CM, et al. Clustering of cardiovascular risk factors in a middle-income country: a call for urgency. *Eur J Prev Cardiol*. 2013;20(2):368–75.
- [3]. Institute for Public Health, National Institutes of Health M of HM. National Health and Morbidity Survey (NHMS) 2019: NCDs - Non-Communicable Diseases: Risk Factors and other Health Problems. Inst Public Heal Natl Institutes Heal (NIH), Minist Heal Malaysia [Internet]. 2019;1. Available from: <http://www.iku.gov.my/nhms-2019>
- [4]. Malaysia M of H. National Strategic Plan for Non-Communicable Disease (NSP-NCD) 2016. 2016;
- [5]. Pencina MJ, Navar AM, Wojdyla D, Sanchez RJ, Khan I, Ellassal J, et al. Quantifying Importance of Major Risk Factors for Coronary Heart Disease. *Circulation*. 2019;139(13):1603–11.
- [6]. Sovova E, Nakladalová M, Kaletova M, Sovova M, Radova L, Kribska M. Which health professionals are most at risk for cardiovascular disease? or do not be a manager. *Int J Occup Med Environ Health*. 2014;27(1):71–7.

- [7]. Aliman KH. Audit finds Malaysian hospitals understaffed, underfunded and overcrowded [Internet]. 2019. Available from: <https://www.theedgemarkets.com/article/audit-finds-malaysian-hospitals-understaffed-underfunded-and-overcrowded>
- [8]. Helmy Hazmi, Wan Rosli Wan Ishak, Rohana Abd Jalil, Gan Siew Hua, Noor Fadzlina Hamid, Rosliza Haron, Mohd Nazri Shafei, Mohd Ismail Ibrahim, Wan Mohamad Wan Bebakar, Shaiful Bahri Ismail KIM. TRADITIONAL CARDIOVASCULAR RISK-FACTORS AMONG HEALTHCARE WORKERS IN KELANTAN, MALAYSIA. *Asian J Trop Med Public Heal*. 2015;46(3):504–11.
- [9]. Eline S van der Valk, Mesut Savas , EFC van R. Stress and Obesity: Are There More Susceptible Individuals? *Current Obesity Reports*. *Curr Obes Rep* [Internet]. 2018;7(2):193–203. Available from: <https://doi.org/10.1007/s13679-018-0306-y>.
- [10]. Kaveh Hosseini, 1 Seyedeh Hamideh Mortazavi, 1 Saeed Sadeghian, 1 Aryan Ayati, 1 Mahdi Nalini, 2 Arya Aminorroaya, 1, 3 Hamed Tavolinejad, 1, 3 Mojtaba Salarifar, 1 Hamidreza Pourhosseini, 1 Afsaneh Aein, 1 Arash Jalali, 1 Ali Bozorgi, 1 Mehdi Mehrani corresponding author1 and FK. Prevalence and trends of coronary artery disease risk factors and their effect on age of diagnosis in patients with established coronary artery disease: Tehran Heart Center (2005–2015). *BMC Cardiovascular Disord*. 2021;21.
- [11]. Alam MF, Nasreen S, Ullah E, Hussain A. The awareness and prevalence of Metabolic Syndrome in medical community of Bahawalpur. *Oman Med J*. 2011;26(1):26–8.
- [12]. Naghavi, M., Abajobir, A. A., Abbafati, C., Abbas, K. M., Abd-Allah, F., Abera, S. F., Aboyans, V., Adetokunboh, O., Ärnlov, J., Afshin, A., Agrawal, A., Kiadaliri, A. A., Ahmadi, A., Ahmed, M. B., Aichour, A. N., Aichour, I., Aichour, M. T. E., Aiyar, S. CJL. Global, regional, and national age-sex specific mortality for 264 causes of death, 1980-2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet* [Internet]. 2017;390(10100):1151–1210. Available from: [https://doi.org/10.1016/S0140-6736\(17\)32152-9](https://doi.org/10.1016/S0140-6736(17)32152-9)
- [13]. Chia CW, Egan JM, Ferrucci L. Age-related changes in glucose metabolism, hyperglycemia, and cardiovascular risk. *Circ Res*. 2018;123(7):886–904.
- [14]. Priebe HJ. The aged cardiovascular risk patient. *Br J Anaesth* [Internet]. 2000;85(5):763–78. Available from: <http://dx.doi.org/10.1093/bja/85.5.763>



- [15]. Kyle RG, Wills J, Mahoney C, Hoyle L, Kelly M, Atherton IM. Obesity prevalence among healthcare professionals in England: A cross-sectional study using the Health Survey for England. *BMJ Open*. 2017;7(12):1–7.
- [16]. Jensen, Johan Høy, Esben Meulengracht Flachs, Janne Skakon, Naja Hulvej Rod JPB& IK. Work-unit organizational changes and risk of cardiovascular disease: a prospective study of public healthcare employees in Denmark. *Int Arch Occup Environ Health* [Internet]. 2019;93:409–19. Available from: <https://link.springer.com/article/10.1007/s00420-019-01493-6>
- [17]. Leong L, Chia SE. Prevalence of cardiovascular risk factors among healthcare staff in a large healthcare institution in Singapore. *Singapore Med J*. 2012;53(8):517–21.