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Physician, Heal Thyself? Cardiovascular Risk Factors and Obesity Among Doctors in Aceh, Indonesia

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ABSTRACT: Background: Healthcare workers are at high risk of cardiovascular disease (CVD) because of unhealthy lifestyles and adverse working conditions. This study assessed cardiovascular risk factors—smoking, blood pressure, total cholesterol, and body mass index (BMI)—among doctors at Dr. Zainoel Abidin Hospital, the main referral hospital in Aceh, Indonesia.

Methods: This cross-sectional study was conducted between May and August 2019 at Dr. Zainoel Abidin Hospital in Banda Aceh, Indonesia, simultaneously with the hospital's annual medical check-up for health workers. Doctors attending the check-up who were aged <65 years, willing to participate, and without a known diagnosis of CVD were enrolled. Body weight was measured using a body composition monitor, and blood pressure was measured using a Riester blood pressure meter. Total cholesterol was measured as part of the hospital's annual medical check-up protocol. Descriptive analyses were performed.

Results: In total, 99 doctors were enrolled. More than half (54.5%) were women, and 45.5% were aged 40–49 years. The smoking rate was 14.1%. SBP >120 mmHg was present in 64.6%, and DBP >80 mmHg in 50.5%. Total cholesterol ≥200 mg/dL was present in 72.7% of participants, while 24.2% had 150–199 mg/dL and 3.1% had <150 mg/dL. Using Asia-Pacific BMI cutoffs, 13.1% were overweight and 73.7% were obese. Overall, 86.9% had a BMI ≥23 kg/m².

Conclusions: Elevated blood pressure measurements, total cholesterol levels ≥200 mg/dL, and overweight or obesity were common among doctors at Dr. Zainoel Abidin Hospital. These findings highlight the potential role of annual medical check-ups in identifying doctors who may benefit from further clinical assessment and preventive support. Workplace health promotion and supportive hospital policies may help strengthen cardiovascular prevention among physicians.

1. INTRODUCTION

The global noncommunicable disease (NCD) burden has risen in many regions even as some infectious disease burdens decline. Cardiovascular disease (CVD) is consistently among the leading NCDs contributing to disability-adjusted life years (DALYs)

and mortality. NCDs accounted for 74.36% of global all-cause deaths in 2019, and the main NCDs were estimated to be cardiovascular diseases, with 18.56 million deaths [1]. The prevalence of cardiovascular disease in Indonesia was 0.85% among the adult population. This figure indicates that about 2.4 million individuals suffer from heart disease, with a trend toward younger patients (average age 43 years). Yogyakarta recorded the highest prevalence (1.67%), while the prevalence of cardiovascular disease in Aceh was 0.77% [2].

Cardiovascular disease risk is shaped by non-modifiable factors, such as age, sex, and family history, and by modifiable "traditional" cardiometabolic and lifestyle factors, such as hypertension, diabetes, dyslipidemia, smoking, obesity, and physical inactivity [3]. In a large physician screening initiative in Thailand ("Save Doctors' Heart"), 28.0% of 1,231 physicians were classified as overweight or obese. Highly prevalent cardiometabolic conditions and risk factors were also reported, including dyslipidemia (75.8%), hypertension (46.3%), and diabetes mellitus (30.5%). The observed prevalence of CVD and coronary artery disease (CAD) in this cohort was 51.7% and 11.2%, respectively [4].

Obesity is widely characterized as a chronic, relapsing, progressive, and heterogeneous disease that increases cardiovascular morbidity and mortality risk. This risk operates through multiple metabolic, endocrine, inflammatory, structural, and hemodynamic pathways that link excess adiposity—especially visceral and abdominal fat—to CVD outcomes [5].

Overweight and obesity are highly prevalent worldwide. In 2022, an estimated 43% of adults globally were overweight, and approximately 16% were living with obesity. In Indonesia, the world's fourth most populous country, the prevalence of obesity has shown an increasing trend. In 2018, it was estimated at 21.8% and increased to 23.4% in 2023. In Aceh, it was 13.9% and 24.4%, respectively [2].

Healthcare workers (HCWs)—particularly physicians, nurses, and emergency medical services professionals—work in occupational settings marked by shift work, night work, high responsibility, and sustained psychosocial strain. These factors are repeatedly linked to sleep disruption, burnout, adverse physiological effects, lack of physical exercise, and smoking profiles relevant to CVD risk [6,7]. Even when HCWs have knowledge or awareness of health risks, that knowledge does not always provide protection [8].

In the UAE, 47.3% of healthcare workers were reported to be overweight or obese in 2020. At Bingham University Teaching Hospital in Nigeria, 63.4% of healthcare workers were overweight or obese in 2016. Evidence from Malaysia further suggests that overweight and obesity are more prevalent among healthcare workers than in age-matched general populations [9].

Physicians occupy a particularly important position in the epidemiology of CVD, since their own health behaviors can shape how preventive care is modeled and delivered to patients. In many low- and middle-income countries, physicians face heavy clinical loads, physician shortages, and dual employment, leaving limited time or institutional support for healthy behavior [15]. When doctors themselves carry a high burden of modifiable cardiovascular risk factors, this may have implications both for their own long-term health and for the sustainability of the health workforce.

In Indonesia, annual medical check-ups for health workers are part of routine occupational health services, but their potential as a platform for cardiovascular risk screening, early intervention, and research has not been fully used. The check-up offers a unique opportunity to capture standardized measurements in a setting that is already part of hospital workflow. However, data on cardiovascular risk among Indonesian doctors remain scarce, and no published studies have examined overweight or obesity among doctors in Indonesia or assessed cardiovascular risks among doctors in Aceh. This study therefore explored cardiovascular risks among doctors working at Dr. Zainoel Abidin Hospital in Aceh, Indonesia. Data were collected in 2019 during the hospital's annual medical check-up for health workers; the implications of this timing are addressed in the Limitations.

2. MATERIALS AND METHODS

2.1 Study design, setting, and timing

This cross-sectional study was conducted between May and August 2019 at Dr. Zainoel Abidin Hospital, the main tertiary referral hospital in Aceh, Indonesia. Data collection took place before the COVID-19 pandemic. The study was conducted simultaneously with the hospital's annual medical check-up for health workers, as described further in Section 2.3.

2.2 Participants and sampling

Doctors attending the annual medical check-up during the study period were invited to participate. Although the annual check-up was offered to health workers more broadly, this analysis was restricted to doctors, including general practitioners and specialists. The inclusion criteria were doctors working at Dr. Zainoel Abidin Hospital, aged <65 years, attending the annual medical check-up during the study period, and willing to participate with written informed consent. Doctors who had already been diagnosed with CVD were excluded. A total of 99 eligible doctors who agreed to participate were included in the analysis. Because participation depended on attendance at the annual medical check-up and willingness to participate, the sample represents a volunteer sample rather than a complete census of all doctors at the hospital. This sampling approach may limit the representativeness of the findings.

2.3 Integration with the annual medical check-up

The study was embedded in the hospital's annual medical check-up for health workers. The check-up protocol had been published and communicated to all doctors prior to the check-up, so that participants were aware of the procedures, measurements, and requirements in advance. This integration allowed cardiovascular risk measurements to be collected during a routine occupational health activity, reduced additional burden on participants, and provided an opportunity to link screening results with workplace health promotion.

However, participation in the check-up and agreement to participate in the study may have introduced selection bias. Doctors who attended the check-up and volunteered for the study may have differed from those who did not participate. This potential limitation is addressed further in the Limitations section.

2.4 Measurements

Participants' characteristics, including age, sex, type of work (with or without night shifts), and smoking history, were recorded. Blood pressure, body weight, height, and total cholesterol were measured as part of the annual check-up. Body weight was measured using the Karada Scan Body Composition Monitor HBF-375 (OMRON HEALTHCARE Co., Kyoto, Japan). Blood pressure was measured using a Riester blood pressure meter. For descriptive purposes, systolic blood pressure (SBP) was dichotomized at 120 mmHg and diastolic blood pressure (DBP) at 80 mmHg, consistent with the binary categories recorded during data collection (SBP >120 vs. ≤120 mmHg; DBP >80 vs. ≤80 mmHg). Because continuous blood pressure values were not retained, full classification into the 2017 ACC/AHA categories of normal, elevated, stage 1, and stage 2 hypertension [22] was not possible. The thresholds reported here are descriptive cutoffs rather than formal diagnostic categories of hypertension and are not directly comparable to studies using complete ACC/AHA classification. Blood pressure was also based on a single measurement at one time point, which may not reflect an individual's usual blood pressure and could be influenced by white-coat effects; ambulatory or repeated measurements were not performed. Total cholesterol was measured as part of the hospital's annual medical check-up protocol. The protocol had been published and communicated to doctors prior to the check-up. The specific assay method and fasting requirements were defined by the hospital's published check-up protocol and applied uniformly to all participants; however, these details were not independently re-verified for this analysis. BMI was calculated as body weight in kilograms divided by height in meters squared (kg/m^2) and classified using Asia-Pacific cutoffs: underweight <18.5 kg/m^2 , normal weight 18.5–22.9 kg/m^2 , overweight 23.0–24.9 kg/m^2 , and obesity ≥25.0 kg/m^2 . For the night-shift analysis, the overweight and obesity categories were combined into a single overweight-or-obese group ($\text{BMI} \geq 23 \text{ kg}/\text{m}^2$) because of small subgroup sizes.

2.5 Statistical analysis

Descriptive analyses were performed using SPSS for Windows version 15 (Chicago, IL, USA). Categorical variables are presented as frequencies and percentages.

2.6 Ethics

Study procedures were explained to the subjects, and informed consent was obtained from all participants prior to the survey. This study was approved by the Institutional Ethics Review Board of Dr. Zainoel Abidin General Hospital (KEPPKN Registration Number: 1171012P; Approval Number: 80/EA/FK-RSUDZA/2019). All procedures complied with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration.

Written informed consent was secured from all participating physicians prior to data collection. To ensure participant confidentiality, all collected data were anonymized and used strictly for research purposes.

3. RESULTS AND DISCUSSION

3.1 Participant characteristics

In total, 99 doctors who worked at Dr. Zainoel Abidin Hospital were enrolled during the annual medical check-up. More than half (54.5%) were women. Most respondents (45.5%) were between 40 and 49 years old, followed by those aged 50–59 years (27.3%), <40 years (23.2%), and 60–65 years (4.0%).

3.2 Cardiovascular risk factors

Regarding cardiovascular risk factors, most participants (85.9%) did not smoke, while 14.1% were reported as smokers.

SBP >120 mmHg was present in 64.6% of participants, and DBP >80 mmHg was present in 50.5%. When examined separately, 35.4% had SBP ≤120 mmHg and 49.5% had DBP ≤80 mmHg. These findings describe the distribution of blood pressure measurements and should not be interpreted as the prevalence of clinically confirmed hypertension.

Total cholesterol was distributed as follows: 3.1% had <150 mg/dL, 24.2% had 150–199 mg/dL, and 72.7% had ≥200 mg/dL.

In terms of BMI, 2 of 99 participants (2.0%) were underweight, 11.1% had normal weight, 13.1% were overweight, and 73.7% were obese according to Asia-Pacific cutoffs. Combining the overweight and obesity categories, 86.9% of participants had a BMI ≥23 kg/m² (Table 1).

Table 1. Sociodemographic characteristics and cardiovascular risk factor measurements of participating doctors (n = 99)

Variable	N	%
Sex		
Male	45	45.5
Female	54	54.5
Age (years)		
<40	23	23.2
40–49	45	45.5
50–59	27	27.3
60–65	4	4.0
Smoking		
No	85	85.9
Yes	14	14.1
Systolic blood pressure		
≤120 mmHg	35	35.4
>120 mmHg	64	64.6
Diastolic blood pressure		
≤80 mmHg	49	49.5
>80 mmHg	50	50.5
Total cholesterol level		

<150 mg/dL	3	3.1
150–199 mg/dL	24	24.2
≥200 mg/dL	72	72.7
BMI (Asia-Pacific cutoffs)		
Underweight (<18.5 kg/m ²)	2	2.0
Normoweight (18.5–22.9 kg/m ²)	11	11.1
Overweight (23–24.9 kg/m ²)	13	13.1
Obese (≥25 kg/m ²)	73	73.7

Percentages may not sum to exactly 100 due to rounding. Note: summing the individually rounded Overweight (13.1%) and Obese (73.7%) rows gives 86.8%, while the combined overweight-or-obese figure reported in the text and Table 2 (86.9%) is calculated directly from raw combined count (86/99); the 0.1-point difference reflects these two valid but distinct rounding approaches

3.3 Obesity and night-shift work

Combining the overweight and obesity categories, 86.9% of participants had a BMI ≥23 kg/m² (Table 2). This proportion was similar among doctors working night shifts and those not working night shifts (86.3% and 87.5%, respectively). The absolute numbers of participants with a BMI ≥23 kg/m² were 44 among doctors working night shifts and 42 among those not working night shifts.

These findings represent a descriptive comparison and do not establish an association between night-shift work and BMI status. The interpretation of this comparison is limited by the small subgroup sizes and the absence of adjustment for potential confounding factors.

Table 2. BMI distribution by night-shift status

BMI Category (Asia-Pacific cutoffs)	Night Shift		Total n (%)
	Yes n (%)	No n (%)	
Underweight (<18.5 kg/m ²)	2 (100.0)	0 (0.0)	2 (2.0)
Normoweight (18.5–22.9 kg/m ²)	5 (45.5)	6 (54.5)	11 (11.1)
Overweight or Obese (≥23 kg/m ²)	44 (51.2)	42 (48.8)	86 (86.9)
Total	51 (51.5)	48 (48.5)	99 (100.0)

For this analysis, overweight and obese categories were combined (BMI ≥23 kg/m²) because of small subgroup sizes.

3.4 Discussion

Our study found a high prevalence of individual cardiovascular risk factor measurements among doctors at Dr. Zainoel Abidin Hospital in Aceh, Indonesia. These findings are consistent with previous studies reporting cardiovascular risk factors among healthcare professionals [10]. The most striking finding was the high proportion of overweight and obesity: 86.9% of doctors had a BMI ≥23 kg/m² using Asia-Pacific BMI cutoffs. In addition, 64.6% had SBP >120 mmHg, 50.5% had DBP >80 mmHg, and 72.7% had total cholesterol ≥200 mg/dL. Smoking was reported by 14.1% of participants. Together, these findings highlight the frequency of potentially modifiable cardiovascular risk factors among doctors in this setting. However, because the analysis was descriptive, the co-occurrence of multiple risk factors at the individual level and overall cardiovascular risk were not quantified. The findings should therefore be interpreted as the distribution of individual risk factor measurements rather than as an estimate of confirmed cardiovascular disease or individual cardiovascular risk.

Blood pressure and cholesterol

SBP >120 mmHg was present in 64.6% of doctors, and DBP >80 mmHg was present in 50.5%. These findings are similar to a prior study in India, which reported a prevalence of SBP >120 mmHg among doctors of 59.2% [11]. Elevated blood pressure in this population is concerning because sustained elevation, even at levels below formal hypertension thresholds, is associated with increased long-term cardiovascular risk, particularly when combined with other metabolic abnormalities.

Our study also found that 72.7% of participants had total cholesterol ≥ 200 mg/dL, while 24.2% were in the 150–199 mg/dL range. This prevalence was higher than that among hospital staff in the UK, where the prevalence of high total cholesterol was only 14.4% [12]. Coronary heart disease and stroke, caused by atherosclerosis in the walls of blood vessels, are the main risks associated with dyslipidemia [13].

Dietary habits, occupational stress, long working hours, and limited opportunities for physical activity may contribute to cardiometabolic risk among physicians. However, these factors were not directly measured in the present study. Their potential contributions to the observed blood pressure and cholesterol distributions therefore cannot be established from our data. Further studies incorporating direct assessments of dietary intake, physical activity, and occupational factors are needed to investigate these potential relationships.

Smoking

We found that 14.1% of respondents were smokers. The prevalence of smoking among physicians at Dr. Zainoel Abidin Hospital was notable, despite the hospital's no-smoking policy and the expectation that doctors would be highly aware of the harmful effects of smoking. Smoking increases the risk of coronary artery disease, especially left anterior descending (LAD) occlusion. Nicotine in cigarettes increases sympathetic activity, myocardial necrosis, and atheroma [14]. These findings suggest that awareness alone is insufficient and that workplace smoking-cessation programs and enforcement of no-smoking policies remain necessary. Given that physicians are often the first point of contact for smoking-cessation counseling, their own smoking behavior may also undermine the effectiveness of such counseling with patients.

Obesity

The study found that the majority of doctors (86.9%) were either overweight or obese. A similar study in India reported different results, with the prevalence of overweight and obesity among doctors at 36.5% and 15.1%, respectively [11]. The difference may partly reflect the use of Asia-Pacific BMI cutoffs in our study, which classify BMI ≥ 23 kg/m² as overweight or obese, whereas WHO international cutoffs use higher thresholds. Even allowing for this, the prevalence of excess adiposity in our sample is concerning.

The findings are concerning because the majority of doctors were overweight or obese. The doctor–patient ratio in Indonesia is not yet ideal, resulting in doctors seeing high numbers of patients each day and leaving little time for self-care, such as exercise or adequate rest. Moreover, because of moonlighting practice in the country, doctors in Indonesia usually work in more than one hospital or clinic, resulting in longer working hours and increased stress [15]. Stress itself can interfere with the endocrine system and increase sympathetic activity, and has been shown to increase blood lipids, which play a role in causing hypertension and coronary disease. In addition, there is no policy that requires hospitals to provide healthy meals and exercise facilities for doctors to promote a healthier lifestyle [15]. These structural constraints mean that individual-level advice alone is unlikely to be effective without corresponding institutional changes.

Night-shift work

We also examined night-shift work. In our data, overweight or obesity was highly prevalent in both groups, and the overall proportion did not differ clearly between night-shift and non-night-shift doctors (86.3% vs 87.5%). However, prior studies have reported that night shifts in healthcare facilities are associated with cardiovascular and metabolic risk [16], and a systematic review found higher overweight/obesity prevalence among HCWs working night shifts than among those who do not [9]. Our night-shift subgroup analysis was likely underpowered to detect a difference, and this null finding should not be interpreted as evidence against an association. Reduced nighttime rest over a long period decreases baseline energy consumption and increases blood glucose levels, raising the risk of diabetes and obesity [17]. Healthcare workers on night shifts are also more likely to snack rather than eat proper meals, as meals are often considered a lower priority [18]. Furthermore, night shifts affect mental

health through circadian disruption [19]. All of these factors may contribute to increased cardiovascular and metabolic risk in HCWs.

Barriers to a healthy lifestyle among doctors, as discussed in previous studies, include lack of time or being too busy, poor lifestyle, and organizational behavior [20]. Tárraga Marcos et al. [21] found that metabolic syndrome and hypertriglyceridemic waist (HTW) among healthcare workers were strongly associated with lack of physical activity, age, sex, and poor eating habits. Poor diet quality increases the risk of obesity and decreases physical fitness, which in turn increases the risk of coronary heart disease. Together with our findings, these studies suggest that obesity and cardiometabolic risk among physicians are shaped by a combination of individual behavior and structural working conditions, rather than by lack of knowledge alone.

Implications for hospital policy and occupational health

Improving lifestyle factors, including physical activity, could lead to better cardiovascular outcomes. The hospital can promote a healthy lifestyle by providing healthier food choices in the cafeteria, offering physical activity facilities, and providing education to increase awareness among hospital staff at all levels. In addition, better shift schedules and hours are necessary to give doctors more time to take care of themselves.

Because this study was embedded in the annual medical check-up, the findings also suggest that the check-up itself can be strengthened as an intervention. Rather than being a purely administrative or diagnostic exercise, the annual check-up could include structured cardiovascular risk assessment, lifestyle counseling, nutrition referral, exercise prescription, smoking-cessation support, and follow-up for doctors with high blood pressure, dyslipidemia, or obesity. This would turn screening into a continuous occupational health program.

Given the high prevalence of individual cardiovascular risk factor measurements in this cohort, a combined approach involving environmental changes, such as healthier cafeteria options, exercise facilities, and protected rest periods, alongside individual-level counseling may be worth considering. However, the effectiveness of these measures was not evaluated in the present study.

3.5 Limitations

This study has several limitations. First, it used a cross-sectional design, so causality cannot be inferred. Second, it was conducted at a single tertiary referral hospital with a relatively small sample of 99 doctors, limiting generalizability. Third, participation depended on willingness and attendance at the annual medical check-up, making this a volunteer sample rather than a complete census; self-selection and healthy-worker effects may therefore affect prevalence estimates. Fourth, although diet and physical activity are discussed, neither was objectively measured.

Fifth, blood pressure was recorded as binary categories (SBP >120 mmHg; DBP >80 mmHg) rather than continuous values, precluding full cross-classification using the 2017 ACC/AHA staging system [22]. Reported thresholds should be interpreted as descriptive cutoffs rather than formal hypertension stages, and are not directly comparable to studies using complete AHA staging. Blood pressure was also based on a single measurement at one time point, which may not reflect an individual's usual blood pressure and could be influenced by white-coat effects; ambulatory or repeated measurements were not performed.

Sixth, cholesterol was based on a single measurement obtained under the hospital's published annual check-up protocol; the specific assay method and fasting status were defined by that protocol and applied uniformly to all participants, but were not independently re-verified for this analysis. Seventh, night-shift analyses involved small subgroups and were not adjusted for potential confounders such as age, sex, specialty, sleep quality, diet, and comorbidities.

Eighth, data were collected in 2019, before the COVID-19 pandemic. The delay between data collection and submission was due to COVID-19-related disruption to the research pipeline, followed by data-cleaning, verification, and manuscript preparation. Because the data predate the pandemic, they may not reflect current post-pandemic workloads, infection-control demands, or changes in physician lifestyle.

4. CONCLUSION

This study found a high prevalence of individual cardiovascular risk factor measurements among doctors at Dr. Zainoel Abidin Hospital. Elevated blood pressure measurements, total cholesterol levels ≥ 200 mg/dL, and overweight or obesity were common. Using Asia-Pacific BMI cutoffs, 86.9% of participants had a BMI ≥ 23 kg/m². These findings highlight the potential

role of annual medical check-ups in identifying doctors who may benefit from further clinical assessment, lifestyle counseling, and appropriate follow-up. Hospital-based prevention strategies may include promoting healthy food choices, supporting physical activity, strengthening smoking-cessation programs, and facilitating adequate rest through appropriate work schedules. Because this study was descriptive, conducted at a single hospital, and based on data collected in 2019, the findings should be interpreted within these limitations and should not be generalized to all doctors in Indonesia. Further studies involving larger and more diverse physician populations are warranted to assess cardiovascular risk factors and their associated determinants.

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CONFLICT OF INTEREST

The authors declare that they have no competing interests.

AUTHOR CONTRIBUTIONS

Conceptualization: [Iflan Nauval, Muhammad Ridwan]; Methodology: [Marisa, Mutia Winanda]; Formal analysis: [Amanda Yufika]; Investigation: [Iflan Nauval, Muhammad Ridwan, Marisa]; Writing—original draft: [Musnady, Winda Yulia]; Writing—review and editing: all authors. All authors read and approved the final manuscript.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request, subject to ethical restrictions and participant confidentiality.

ETHICS STATEMENT

This study was approved by the Institutional Ethics Review Board of Dr. Zainoel Abidin General Hospital (KEPPKN Registration Number: 1171012P; Approval Number: 80/EA/FK-RSUDZA/2019). Written informed consent was obtained from all participants.

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