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Physical Activity, Body Mass Index, Family History and Screen-Detected Cardiometabolic Risk among Health Polytechnic Lecturers in Serang, Indonesia

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ABSTRACT

Non-communicable diseases (NCDs) are rising among Indonesian working-age adults, yet evidence on academic staff remains scarce. This study examined the association of physical activity, sociodemographic factors, family history of NCDs, body mass index (BMI) and total cholesterol with a screen-detected cardiometabolic risk condition among lecturers of a public health polytechnic in Serang, Indonesia. A cross-sectional study was conducted from March 2026 to 10 September 2026 among all 64 permanent lecturers of Politeknik Kesehatan Kemenkes Banten (total sampling). Data were collected with a structured questionnaire, anthropometry, automated blood pressure measurement and point-of-care testing of fasting blood glucose and total cholesterol. Physical activity was classified from a single self-reported item as active (≥30 min/day) or inactive, and BMI was dichotomised at 25.0 kg/m² (Asia-Pacific cut-off). The outcome was elevated blood pressure (≥130/80 mmHg) and/or elevated fasting blood glucose (≥100 mg/dL) at a single screening visit; total cholesterol was analysed as an independent variable only. Crude odds ratios (ORs) with 95% confidence intervals (CIs) were estimated. The condition was found in 25 lecturers (39.1%): 20 had both indicators, four had elevated blood pressure only and one had elevated fasting glucose only. In unadjusted analyses, the condition was associated with elevated total cholesterol (OR 10.50; 95% CI 2.98–37.00), BMI ≥25.0 kg/m² (OR 6.13; 1.77–21.18), physical inactivity (OR 4.35; 1.48–12.75) and family history of NCDs (OR 3.69; 1.21–11.24), although the wide CIs indicate imprecise estimates. Age, sex and length of employment were not significantly associated. About two in five lecturers had screen-detected elevated blood pressure and/or fasting glucose. These exploratory findings support periodic workplace screening with confirmatory follow-up and programmes promoting physical activity and weight management among academic staff.

Keywords: Cardiometabolic risk; Body mass index; Family history; Physical activity; University lecturers

INTRODUCTION

Non-communicable diseases (NCDs), chiefly cardiovascular disease, diabetes, cancer and chronic respiratory disease, are the leading cause of death worldwide and account for most premature adult mortality (World Health Organization, 2024). High systolic blood pressure, high fasting plasma glucose, high body mass index (BMI) and high low-density lipoprotein (LDL) cholesterol are among the leading metabolic risk factors for global disability-adjusted life years (GBD 2019 Risk Factors Collaborators, 2020). The number of adults living with hypertension doubled between 1990 and 2019, and the global prevalence of diabetes continues to rise, with the steepest increases in low- and middle-income countries (NCD Risk Factor Collaboration [NCD-RisC], 2021, 2024).

Indonesia is in an advanced phase of this epidemiological transition. A systematic review showed that the burden of chronic NCDs has grown faster than the capacity of the health system to manage it (Schröders et al., 2017). The 2023 Indonesian Health Survey reported a measured hypertension prevalence of 30.8% among adults aged ≥18 years and a diabetes prevalence of 11.7% based on blood glucose testing among people aged ≥15 years (Ministry of Health of the Republic of Indonesia, 2024). Hypertension among Indonesian adults is socially patterned and common even in the working-age population (Peltzer & Pengpid, 2018).

Physical inactivity is a major, modifiable contributor to this burden. More than a quarter of adults worldwide do not meet recommended activity levels (Guthold et al., 2018). Regular activity lowers the risk of hypertension, type 2 diabetes, cardiovascular events and all-cause mortality in a dose-dependent way (Kyu et al., 2016; Lear et al., 2017), and current World Health Organization (WHO) guidelines

recommend 150–300 minutes of moderate-intensity activity per week for adults (Bull et al., 2020). In Indonesia, the prevalence of low physical activity among adults aged 40–80 years rose from 18.2% to 39.6% between 2007 and 2014, and low activity was associated with higher 10-year cardiovascular risk and higher health-care costs (Anindya et al., 2022).

Office-based professionals are a population of particular concern. Prolonged sitting is associated with a higher incidence of cardiovascular disease, type 2 diabetes and mortality, especially when it is not offset by moderate-to-vigorous activity (Ekelund et al., 2016; Patterson et al., 2018). University lecturers spend long hours teaching, preparing materials, conducting research and completing administrative reports, and long working hours are themselves associated with ischaemic heart disease and stroke (Pega et al., 2021). Studies among academic staff have reported a high burden of NCD risk factors: hypertension was found in 26.2% of faculty at a Ugandan university, where 78.7% were physically inactive (Alinaitwe et al., 2024), and screening in Indonesian universities has found high proportions of prehypertension, obesity and hyperglycaemia among staff and lecturers (Rakhmania et al., 2025; Septiani & Ariscasari, 2023).

Lecturers at health polytechnics are expected to model healthy behaviour to students and communities, but knowledge of health risks does not necessarily translate into practice. Previous Indonesian studies of university employees have mainly described the prevalence of individual risk factors among general university staff (Rakhmania et al., 2025; Septiani & Ariscasari, 2023) or focused on other outcomes such as fatty liver disease (Husaema et al., 2025). Lecturers of Ministry of Health polytechnics, whose duties combine teaching, research and community service (Tri Dharma), have rarely been studied, and, to our knowledge, no study has examined objectively measured blood pressure and fasting glucose together with physical activity, family history, BMI and total cholesterol in this occupational group in Banten Province. This study provides baseline data from the first year of a two-year institutional research programme, intended to inform a workplace health promotion programme for the institution and similar health polytechnics. This study therefore aimed to estimate the proportion of lecturers with a screen-detected cardiometabolic risk condition (elevated blood pressure and/or elevated fasting blood glucose) at a public health polytechnic in Serang and to examine the unadjusted associations of this condition with physical activity, sociodemographic characteristics, family history of NCDs, BMI and total cholesterol.

METHODS

Study design and setting

This was an analytical cross-sectional study reported according to the STROBE guidelines (von Elm et al., 2007). It was conducted at Politeknik Kesehatan Kemenkes Banten, a public health polytechnic under the Ministry of Health in Serang, Banten Province, Indonesia. Data were collected from March 2026 to 10 September 2026 as the first year of a two-year research programme.

Participants

The study population comprised all permanent lecturers of the institution, and total sampling was applied. Lecturers on extended leave (for example, study, maternity or sick leave) throughout the data collection period were excluded before recruitment because they could not attend the on-site examination. All other permanent lecturers were invited to participate, and the 64 lecturers who gave written informed consent and completed both the questionnaire and the physical examination were included in the analysis.

Questionnaire

A structured, self-administered questionnaire recorded age, sex, highest education, length of employment, family history of NCDs and habitual physical activity. Family history was recorded as a single yes/no item asking whether any first-degree relative (parent, sibling or child) had been diagnosed with hypertension, diabetes mellitus or heart disease; the three conditions were combined into one variable, and the reports were self-reported and not verified against medical records. Physical activity was assessed with one item asking whether the participant habitually engaged in physical activity such as brisk walking, cycling, sports or exercise for at least 30 minutes per day as part of their usual routine (response options: yes/no). Participants who reported such activity were classified as active and the others as inactive. The item did not record intensity, number of days per week or domain (occupational, transport or leisure time), and sitting time was not measured. The questionnaire also contained items on perceived work-related stress and the Tri Dharma domain perceived as most stressful; these were collected for the second-year component of the research programme, are outside the objectives of this article and are not reported here.

Anthropometry

Body weight and height were measured by trained medical laboratory technologists with a calibrated digital scale and a stadiometer, with participants in light clothing and without shoes, and BMI was calculated as weight (kg) divided by height squared (m^2). Waist circumference and other indicators of central obesity were not measured.

Blood pressure

Blood pressure was measured in the seated position after at least 5 minutes of rest with an automated oscillometric digital sphygmomanometer (Omron Healthcare, Kyoto, Japan) and a standard adult upper-arm cuff, following the manufacturer's instructions. A single reading was taken and used for analysis. All readings were obtained at a single screening visit; the results therefore indicate screen-detected elevated blood pressure rather than a clinical diagnosis of hypertension, which requires repeated measurements on separate occasions or out-of-office confirmation (Jones et al., 2025; McEvoy et al., 2024).

Fasting blood glucose and total cholesterol

Fasting blood glucose and total cholesterol were measured in capillary fingertip blood after an overnight fast

of at least 8 hours using the EasyTouch GCU multi-parameter point-of-care testing (POCT) meter (Bioptik Technology Inc., Taiwan) with the corresponding EasyTouch glucose and cholesterol test strips. Test strips were used within their expiry date and stored as instructed by the manufacturer, and all tests were performed by trained medical laboratory technologists according to the manufacturer's instructions under the same fasting and sampling conditions. The device was not validated against laboratory reference methods in this study, and the manufacturer states that it is not intended for the diagnosis of diabetes or hypercholesterolaemia; POCT values were therefore used for screening classification only. Total cholesterol was measured without a lipid panel, so low-density lipoprotein (LDL) cholesterol, high-density lipoprotein (HDL) cholesterol and triglycerides were not available.

Variables and definitions

The outcome, referred to as a screen-detected cardiometabolic risk condition, was defined as elevated blood pressure (systolic ≥130 mmHg and/or diastolic ≥80 mmHg) and/or elevated fasting blood glucose (≥100 mg/dL) at the screening visit. The blood pressure threshold is the lower limit of stage 1 hypertension in the American College of Cardiology/American Heart Association guideline (Jones et al., 2025) and lies within the elevated blood pressure range of the European guideline (McEvoy et al., 2024); it was chosen as a sensitive screening threshold for early risk rather than as a diagnostic criterion. The glucose threshold is the lower limit of impaired fasting glucose (100–125 mg/dL); a single POCT value ≥126 mg/dL does not establish diabetes mellitus, which requires confirmatory laboratory testing (American Diabetes Association Professional Practice Committee, 2025). The two indicators were combined because both are early, screen-detectable components of cardiometabolic risk that share major determinants such as adiposity, physical inactivity and family history, and because the institution's screening programme targets them jointly. The outcome therefore represents the presence of selected cardiometabolic risk indicators and not the prevalence of diagnosed NCDs. Classification was based solely on the screening measurements; use of antihypertensive or glucose-lowering medication was not used to reclassify participants. Independent variables were dichotomised as follows: physical activity (active vs. inactive, as defined above; the 30-minute daily cut-off was chosen for simplicity and broadly corresponds to the commonly promoted daily target, but it does not establish compliance with WHO recommendations of 150–300 minutes of moderate-intensity or 75–150 minutes of vigorous-intensity activity per week (Bull et al., 2020)); age (≥40 vs. <40 years); sex; length of employment (≥10 vs. <10 years); family history of NCDs (yes vs. no); BMI (≥25.0 vs. <25.0 kg/m²); and total cholesterol (≥200 vs. <200 mg/dL). In the WHO Asia-Pacific classification, a BMI of 23.0–24.9 kg/m² denotes overweight and ≥25.0 kg/m² denotes obesity (WHO Regional Office for the Western Pacific, 2000); the ≥25.0 kg/m² cut-off was used because cardiometabolic risk is substantially increased at this level in Asian populations (WHO Expert Consultation, 2004) and because the small sample did not allow more categories. The 200 mg/dL (5.2 mmol/L) cut-off is the conventional upper limit of desirable total cholesterol used in screening (National Cholesterol Education Program Expert Panel, 2002). Total cholesterol was analysed only as an independent variable and was not part of the outcome definition.

Statistical analysis

Categorical variables are presented as frequencies and percentages; percentages in Tables 1 and 2 use the total sample (n = 64) as the denominator, those in Table 3 are row percentages, and all are rounded to one decimal place. Associations between each independent variable and the outcome were assessed with Pearson's chi-square test with Yates' continuity correction, and two-sided Fisher's exact test was reported for all variables as a sensitivity analysis because of the small sample (smallest expected cell count 5.5). Crude ORs with 95% CIs were estimated with Woolf's (logit) method, $\ln(OR) \pm 1.96 \times \sqrt{(1/a + 1/b + 1/c + 1/d)}$; no cell contained a zero count, so no zero-cell correction was required. Because Woolf intervals can be inaccurate with small cell counts (smallest observed cell count = 4), exact conditional 95% CIs were also calculated. Each OR compares the first listed category with the reference category shown in Table 3. Statistical significance was set at $p < 0.05$. Multivariable logistic regression was not fitted. With 25 outcome events and seven candidate variables (about 3.6 events per variable), an adjusted model would produce unstable and potentially biased estimates (Peduzzi et al., 1996). The 10-events-per-variable rule is a guideline rather than an absolute criterion and can be relaxed in some situations (Vittinghoff & McCulloch, 2007), but the present number of events was too small for reliable control of confounding. All estimates are therefore unadjusted, and the analysis is exploratory. Analyses were performed with IBM SPSS Statistics version 24 (IBM Corp., Armonk, NY, USA); exact conditional CIs were computed with the SciPy library (version 1.18) in Python.

RESULTS AND DISCUSSION

Participant characteristics

All 64 lecturers were analysed (Table 1). Most were women (78.1%), held a master's degree (92.2%) and were aged ≥40 years (56.3%). More than half had a BMI ≥25.0 kg/m² (60.9%), elevated total cholesterol (53.1%) and a family history of NCDs (57.8%), and 39.1% were physically inactive. Screen-detected elevated blood pressure was found in 24 lecturers (37.5%) and elevated fasting blood glucose in 21 (32.8%). Twenty lecturers had both indicators, four had elevated blood pressure only and one had elevated fasting blood glucose only, giving a screen-detected cardiometabolic risk condition in 25 lecturers (39.1%) (Table 2). Thus, 20 of the 25 cases (80.0%) had both indicators, and elevated blood pressure was present in 24 of the 25 cases.

Table 1. Characteristics of the lecturers (n = 64)

Variable	Category	n	%
Age	≥40 years	36	56.3
	<40 years	28	43.8
Sex	Female	50	78.1
	Male	14	21.9
Highest education	Master's degree	59	92.2
	Doctoral degree	5	7.8
Length of employment	≥10 years	33	51.6
	<10 years	31	48.4
Family history of NCDs	Yes	37	57.8
	No	27	42.2
Physical activity	Inactive	25	39.1
	Active (≥30 min/day)	39	60.9
BMI	≥25.0 kg/m²	39	60.9
	<25.0 kg/m²	25	39.1
Total cholesterol (POCT)	≥200 mg/dL	34	53.1
	<200 mg/dL	30	46.9
Fasting blood glucose (POCT)	≥100 mg/dL	21	32.8
	<100 mg/dL	43	67.2
Blood pressure (screening)	≥130/80 mmHg	24	37.5
	<130/80 mmHg	40	62.5
Screen-detected cardiometabolic risk condition	Yes	25	39.1
	No	39	60.9

Note: Percentages use n = 64 as the denominator and are rounded to one decimal place; totals may differ from 100.0% because of rounding. BMI categories follow the WHO Asia-Pacific classification. Blood pressure and glucose values are from a single screening visit using automated sphygmomanometry and POCT. BMI = body mass index; NCD = non-communicable disease; POCT = point-of-care testing.

Table 2. Components of the screen-detected cardiometabolic risk condition (n = 64)

Outcome component	n	% of all lecturers (n = 64)	% of cases (n = 25)
Elevated blood pressure and elevated fasting blood glucose	20	31.3	80.0
Elevated blood pressure only	4	6.3	16.0
Elevated fasting blood glucose only	1	1.6	4.0
Screen-detected cardiometabolic risk condition (total)	**25**	**39.1**	**100.0**
Neither indicator elevated	39	60.9	–
Total elevated blood pressure	24	37.5	96.0
Total elevated fasting blood glucose	21	32.8	84.0

Note: The number with both indicators was derived from the observed counts (24 + 21 − 25 = 20). Elevated blood pressure = systolic ≥130 mmHg and/or diastolic ≥80 mmHg; elevated fasting blood glucose = ≥100 mg/dL; both measured at a single screening visit.

Factors associated with the screen-detected cardiometabolic risk condition

In unadjusted analyses, four factors were significantly associated with the condition (Table 3). The proportion with the condition was 61.8% among lecturers with elevated total cholesterol versus 13.3% among those with lower cholesterol (crude OR 10.50; 95% CI 2.98–37.00). It was 53.8% among those with BMI ≥25.0 kg/m² versus 16.0% among those with lower BMI (OR 6.13; 1.77–21.18), 60.0% among inactive versus 25.6% among active lecturers (OR 4.35; 1.48–12.75), and 51.4% among those with a family history versus 22.2% without (OR 3.69; 1.21–11.24). Age, sex and length of employment were not significantly associated; in a sample of this size, this does not establish the absence of an association. Fisher's exact tests and exact CIs gave the same conclusions for all variables (Table 3), but all CIs were wide, indicating considerable imprecision.

Table 3. Unadjusted association of physical activity, sociodemographic factors, family history, BMI and total cholesterol with the screen-detected cardiometabolic risk condition (n = 64)

Variable	Condition present, n (%)	Condition absent, n (%)	Crude OR (95% CI)[a]	Exact 95% CI[b]	p-value[c]	Fisher's p[d]
Physical activity						
Inactive	15 (60.0)	10 (40.0)	4.35 (1.48–12.75)	1.31–14.66	0.013	0.009
Active	10 (25.6)	29 (74.4)	Ref.			
Age						
≥40 years	16 (44.4)	20 (55.6)	1.69 (0.60–4.73)	0.54–5.43	0.458	0.439
<40 years	9 (32.1)	19 (67.9)	Ref.			
Sex						
Male	6 (42.9)	8 (57.1)	1.22 (0.37–4.07)	0.30–4.75	0.985	0.765
Female	19 (38.0)	31 (62.0)	Ref.			
Length of employment						
≥10 years	14 (42.4)	19 (57.6)	1.34 (0.49–3.67)	0.44–4.16	0.755	0.616
<10 years	11 (35.5)	20 (64.5)	Ref.			

Variable	Condition present, n (%)	Condition absent, n (%)	Crude OR (95% CI)[a]	Exact 95% CI[b]	p-value[c]	Fisher's p[d]
Family history of NCDs						
Yes	19 (51.4)	18 (48.6)	3.69 (1.21–11.24)	1.09–13.59	0.036	0.022
No	6 (22.2)	21 (77.8)	Ref.			
BMI						
≥25.0 kg/m²	21 (53.8)	18 (46.2)	6.13 (1.77–21.18)	1.60–28.34	0.006	0.004
<25.0 kg/m²	4 (16.0)	21 (84.0)	Ref.			
Total cholesterol						
≥200 mg/dL	21 (61.8)	13 (38.2)	10.50 (2.98–37.00)	2.66–48.95	<0.001	<0.001
<200 mg/dL	4 (13.3)	26 (86.7)	Ref.			
Total	**25 (39.1)**	**39 (60.9)**				

Note: Row percentages are shown. [a] Woolf (logit) method. [b] Exact conditional method. [c] Pearson's chi-square test with Yates' continuity correction. [d] Two-sided Fisher's exact test. Condition = elevated blood pressure (≥130/80 mmHg) and/or elevated fasting blood glucose (≥100 mg/dL). Ref. = reference category; OR = odds ratio; CI = confidence interval; BMI = body mass index; NCD = non-communicable disease.

Proportion of lecturers with screen-detected cardiometabolic risk

About two in five lecturers (39.1%) had screen-detected elevated blood pressure and/or fasting blood glucose. Comparison with national estimates requires caution. The 2023 Indonesian Health Survey reported a measured hypertension prevalence of 30.8% among adults, based on the 140/90 mmHg threshold, and a diabetes prevalence of 11.7% based on blood glucose testing (Ministry of Health of the Republic of Indonesia, 2024), whereas our outcome uses lower screening thresholds, a single visit and POCT, and combines two indicators in a small occupational group. Our figure is therefore not an estimate of hypertension or diabetes prevalence and would be expected to exceed estimates based on diagnostic thresholds. Studies of academic staff that used different definitions reported hypertension in 26.2% of university faculty in Uganda (Alinaitwe et al., 2024) and hypertension in 15.6% and hyperglycaemia in 17.4% of staff of a private university in Banda Aceh (Septiani & Ariscasari, 2023). Our thresholds also capture stage 1 hypertension and impaired fasting glucose (American Diabetes Association Professional Practice Committee, 2025; Jones et al., 2025). The finding should be read as a high proportion of lecturers with early cardiometabolic risk indicators that warrant confirmatory testing. Whether these indicators are reversible cannot be determined from a cross-sectional design, although lifestyle modification is known to lower blood pressure and to delay progression from impaired fasting glucose to diabetes in intervention studies.

Physical activity

Inactive lecturers had about four times higher unadjusted odds of the condition than active colleagues (OR 4.35; 95% CI 1.48–12.75). Established physiological evidence indicates that regular activity improves insulin sensitivity, lowers blood pressure, improves the lipid profile and helps control body weight, whereas inactivity reduces energy expenditure and promotes adiposity (Bull et al., 2020); these mechanisms were not assessed in the present study. This result agrees with Indonesian panel data, in which low activity was associated with overweight, hypertension, diabetes and a two-fold higher 10-year cardiovascular risk (Anindya et al., 2022), and with dose-response meta-analyses linking higher activity to lower risk of diabetes and cardiovascular events (Kyu et al., 2016; Lear et al., 2017). However, because adjusted analysis was not possible, the association may be confounded by age, sex, diet, smoking and other lifestyle factors, and part of it may operate through BMI, which lies on a plausible pathway between inactivity and cardiometabolic risk. The single-item measure did not capture intensity, weekly volume or domains of activity and cannot be interpreted as compliance with WHO recommendations (Bull et al., 2020); misclassification is therefore likely. The larger OR in our study likely reflects the small sample, the crude estimate and this cruder activity measure. Lecturers' work is often assumed to involve prolonged sitting and long working hours, which are linked to adverse cardiometabolic outcomes in other studies (Ekelund et al., 2016; Patterson et al., 2018; Pega et al., 2021), but sitting time and working hours were not measured here, so this explanation remains a hypothesis rather than a finding of this study.

Body mass index

Lecturers with a BMI ≥25.0 kg/m² had about six times higher unadjusted odds of the condition, but the wide CI (1.77–21.18; exact CI 1.60–28.34) indicates that the true magnitude is uncertain. According to established evidence, excess adipose tissue, particularly visceral fat, promotes chronic low-grade inflammation, insulin resistance, dyslipidaemia and raised blood pressure. Large cohort studies show that overweight and obesity increase the risk of cardiometabolic multimorbidity and all-cause mortality (Global BMI Mortality Collaboration, 2016; Kivimäki et al., 2017). The high proportion of lecturers with BMI ≥25.0 kg/m² (60.9%) mirrors findings among Indonesian university staff, where obesity was reported in 36.6% to 65.1% (Rakhmania et al., 2025; Septiani & Ariscasari, 2023). Because Asian populations develop metabolic complications at lower BMI than Europeans (WHO Expert Consultation, 2004), weight management should be a core element of staff health programmes. BMI does not distinguish fat from lean mass or capture abdominal adiposity, and waist circumference was not

measured; future studies should include indicators of central obesity.

Total cholesterol

Elevated total cholesterol showed the strongest unadjusted association with the condition, but it was also the least precise estimate (OR 10.50; 95% CI 2.98–37.00; exact CI 2.66–48.95), so the magnitude should not be overstated. Total cholesterol was an independent variable and was not part of the outcome definition. The association is biologically plausible because dyslipidaemia, raised blood pressure and dysglycaemia frequently cluster, and this clustering has been attributed in the literature to shared determinants such as adiposity, insulin resistance, diet and physical inactivity. Insulin resistance and adiposity-related mechanisms were not measured in this study, however, so these explanations remain hypotheses. Statistically, the association may also reflect confounding by BMI, age and lifestyle, and the cross-sectional design does not establish its direction. Elevated LDL and non-HDL cholesterol are causal factors for atherosclerotic cardiovascular disease (Ference et al., 2017), non-HDL cholesterol predicts long-term cardiovascular risk across 38 cohorts (Brunner et al., 2019), and higher total cholesterol is associated with a higher risk of coronary heart disease in both women and men (Peters et al., 2016); these studies concern cardiovascular events rather than the screening outcome examined here. Because current guidelines base lipid risk management on LDL and non-HDL cholesterol (Mach et al., 2020), total cholesterol alone provides only limited information, and a full lipid profile is recommended in future studies.

Family history

A family history of NCDs was associated with 3.7 times higher unadjusted odds of the condition (OR 3.69; 95% CI 1.21–11.24). This is in line with a meta-analysis from Ethiopia, in which a family history of hypertension (OR 2.56) and of diabetes (OR 3.69) was associated with hypertension (Tiruneh et al., 2020), and with the Ugandan faculty study (Alinaitwe et al., 2024). Family history may reflect inherited susceptibility as well as shared household diet, physical activity habits and socioeconomic conditions; these pathways were not examined separately in the present study. In the EPIC-InterAct study, the excess diabetes risk linked to family history was not explained by anthropometric, lifestyle or known genetic factors (InterAct Consortium, 2013). In addition, family history was self-reported, combined three conditions, and was not verified, so some misclassification is possible. Family history is easy to record and, together with other risk factors such as BMI, blood pressure and glucose, may help identify lecturers who need closer follow-up; on its own, however, it is not sufficient to determine screening frequency, which should follow national screening guidance.

Age, sex and length of employment

The condition was more frequent among lecturers aged ≥40 years (44.4% vs. 32.1%), men (42.9% vs. 38.0%) and those employed ≥10 years (42.4% vs. 35.5%), but none of these differences was statistically significant. A non-significant result in a small sample does not establish the absence of an association; for example, the CI for age (0.60–4.73) is compatible both with no association and with a substantially higher risk among older lecturers. Population studies consistently show that age is a strong NCD risk factor (NCD-RisC, 2021; Peltzer & Pengpid, 2018), and sex differences in cardiometabolic risk are well documented (Gerdts & Regitz-Zagrosek, 2019; Kautzky-Willer et al., 2023). The lack of significance here most likely reflects limited power: with 64 participants, the study could detect only large effects. The narrow age range of a working population and the small number of men (n = 14) further reduce contrast. Length of employment largely overlaps with age and may act as a proxy for cumulative exposure to sedentary work rather than a cause in itself (Husaema et al., 2025).

Implications

Of the factors identified, physical inactivity and BMI, and to some extent total cholesterol, are potentially modifiable through lifestyle change and, where indicated, medical management, whereas family history, age and sex are non-modifiable background factors that help identify higher-risk individuals. Health polytechnics can act as health-promoting workplaces by offering periodic screening of blood pressure, glucose and lipids with referral for confirmatory testing of abnormal results; structured physical activity during working hours; reduced sitting time; and healthy food options. Reviews of workplace health promotion show beneficial effects on physical activity, body weight and cardiometabolic risk factors (Proper & van Oostrom, 2019). Integrating these measures with the national community NCD screening programme (Posbindu PTM) would allow early detection and follow-up in line with national screening guidance.

Strengths and limitations

The study used objective measurements of blood pressure, glucose, cholesterol and anthropometry rather than self-reported diagnoses, and it covered the whole eligible lecturer population of the institution. Several limitations apply. First, the cross-sectional design does not allow causal inference, and reverse causation is possible (for example, lecturers already diagnosed may have changed their behaviour). Second, the sample size and number of outcome events were small and all estimates are unadjusted; multivariable adjustment was not feasible, so confounding among BMI, total cholesterol, physical activity, age and family history cannot be excluded, and the CIs are wide. Third, the outcome was based on a single screening visit and POCT that was not validated against laboratory methods in this study, which may misclassify participants compared with repeated measurements and laboratory diagnosis; medication use was not used in the classification. Fourth, the composite outcome may conceal different risk-factor patterns for blood pressure and glucose; because 20 of the 25 cases had both indicators and only one case had elevated glucose alone, separate analyses would add little information in this sample, but they should be performed in larger studies. Fifth, physical

activity was assessed with a single self-reported item rather than a validated instrument such as the Global Physical Activity Questionnaire, sedentary time was not measured and family history was self-reported, which may introduce recall and classification bias. Sixth, BMI was analysed only as a dichotomous variable, waist circumference was not measured and total cholesterol was measured without LDL, HDL or triglycerides. Finally, the study was conducted in one public health polytechnic, and the exclusion of lecturers on extended leave may have introduced a healthy-worker selection bias; the findings should therefore not be generalised to lecturers of other health polytechnics or academic institutions. Larger multi-institution studies with validated activity measures, repeated or laboratory-confirmed outcome measurements and multivariable analysis are needed.

CONCLUSION

About two in five lecturers (39.1%) at a public health polytechnic in Serang had screen-detected elevated blood pressure and/or elevated fasting blood glucose; these are screening findings and not diagnosed NCDs. In unadjusted analyses, the condition was associated with elevated total cholesterol, BMI ≥25.0 kg/m², physical inactivity and a family history of NCDs, whereas no significant associations were found for age, sex or length of employment. Because the estimates are imprecise and unadjusted, these associations should be regarded as exploratory and not as independent or causal effects. Health polytechnics should consider workplace health programmes that combine periodic screening of blood pressure, glucose and lipids, with confirmatory testing of abnormal results, and measures to increase physical activity, reduce sitting time and support weight management, with attention to lecturers who have several risk factors. Future multi-institution studies with larger samples, validated physical activity instruments, repeated or laboratory-based outcome measurements and multivariable or longitudinal analyses are needed to confirm these findings.

DECLARATIONS

Ethics Approval and Consent to Participate. The study was approved by the Health Research Ethics Committee (Komisi Etik Penelitian Kesehatan) of Politeknik Kesehatan Kemenkes Banten (approval No. DP.04.03/F.XXII.25/95/2026). All participants gave written informed consent, participation was voluntary and data were anonymised before analysis. Each participant received their examination results and individual counselling.

Availability of Data and Materials. The datasets used and analysed during the current study are available from the corresponding author upon reasonable request.

Conflict of Interest. The authors declare no conflict of interest.

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