ABSTRACT

Incident Hypertension, Diabetes, and Overweight/Obesity as Mediators Between Behavioral, Healthcare-Support, and Psychosocial Exposures and Incident Cardiovascular Disease: A Seven-Year Cohort Study of Indonesian Adults

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Background : Cardiovascular disease (CVD) caused 19.2 million deaths worldwide in 2023, nearly 80% of its burden attributable to modifiable risk factors.

Objective : To examine the association of overweight/obesity, incident diabetes, and incident hypertension as separate mediators of associations between behavioral, healthcare-support, and psychosocial exposures with incident CVD among Indonesian adults free of baseline hypertension, diabetes, and CVD.

Research Methods/ Implementation Methods : Retrospective cohort study of IFLS Waves 4-5 (analytic N=24,984). Baseline exposures were behavioral (smoking status, physical activity, dietary pattern), healthcare-support (health insurance, check-up history), and psychosocial (stress by CES-D 10). GSEM with Multiple Imputation estimated four survey-weighted Poisson equations; Sobel indirect effects were summed across mediators.

Results : The seven-year survey-weighted proportion developing CVD was 2.22% (95% CI 2.00-2.45%). Hypertension was strongly associated with incident CVD (IRR 4.73; 95% CI 3.92-5.70), followed by diabetes (1.90; 1.34-2.70) and overweight/obesity (1.24; 0.99-1.54). Versus never smokers, light/moderate smoking showed combined indirect effects below 1 (IRR 0.52; 0.36-0.75 and 0.58; 0.40-0.85). Check-up history showed the largest combined indirect effect (IRR 2.11; 1.51-2.94), followed by stress (1.75; 1.21-2.53) and insurance (1.34; 1.08-1.66). Neither high physical activity (IRR 0.81; 0.60-1.10) nor dietary pattern showed a significant combined indirect effect. No exposure had significant direct effects.

Conclusion/Lesson Learned : Incident hypertension was the largest pathway through which smoking, health check-up history, and stress were associated with incident CVD. Diabetes was a secondary pathway for check-up history, and overweight/obesity did not show a statistically significant mediating role. The inverse indirect effects of light and moderate smoking came from lower incident hypertension and do not indicate cardioprotection. Hypertension and diabetes were self-reported, so the indirect effects of check-up history and insurance likely partly reflect greater detection. Preventing hypertension and diabetes should be a priority for CVD prevention in Indonesia, including regular blood pressure and glucose screening for adults without these conditions.

Keyword : cardiovascular disease, mediation analysis, cardiometabolic risk, GSEM, Indonesia, IFLS