# Gizi COVID-19 Bagi Remaja" Application as COVID-19 Prevention

*by* Sri Ratna Rahayu

# Type D Personality and Essential Hypertension in Semarang City, Indonesia: A Primary Healthcare Center-based Case-Control Study

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## Article Info

## Abstract

*Type D personality is defined as the interaction between negative affectivity (NA) and social inhibition (SI). Hypertension has the highest cases in primary healthcare center (PHC) in Semarang City compared to other non-communicable diseases. This study aims to determine type D personality role on essential hypertension. It was a case-control study conducted at the PHC in Semarang City from January 2020 to March 2021 with 139 cases and 139 controls among 18-60 years old patients. Sample collection was performed by stratified random sampling. The instruments used were the DS-14 scale, structured questionnaire, IPAQ-SF, food frequency questionnaire, and the Holmes and Rahe Stress Scale, while data were analyzed using logistic regression. The prevalence of type D personality in the case group (64%; 95%CI: 55.9%-72.1%) was higher than in the control (36.7%; 95%CI: 28.7%-44.7%). Type D personality was discovered to be significantly associated with essential hypertension (OR: 3.07; 95%CI: 1.83-5.16). After other covariates adjustment, the association was still statistically significant (AdjOR: 2.41; 95%CI: 1.32-4.41).*

## INTRODUCTION

Globally, the 5 main causes of premature death are cardiovascular disease, diarrhea, respiratory infections, cancer, neonatal disorders, HIV/ AIDS, and tuberculosis (Prospective Studies Collaboration, 2017). Non-communicable diseases in Indonesia caused 73% of all deaths and 27% of them were premature deaths (WHO, 2017). Various risk factors for non-communicable diseases include smoking and exposure to cigarette smoke, unhealthy diet, lack of physical activity, alcohol consumption, and family history. As for intermediate risk factors for non-communicable diseases are obesity, high blood pressure, high blood sugar, and high cholesterol. Efforts to prevent non-communicable diseases are more focused on identified risk factors (Ministry of Health of Indonesia, 2017).

In Indonesia, high blood pressure is the first ranked risk factor for inability to perform and premature death (DALYs), followed by an unhealthy diet, high blood sugar, tobacco use, and malnutrition status in mothers and children (Mboi et al., 2016). High blood pressure or hypertension is a condition of a person's blood pressure > 140/90 mmHg (Mancia et al., 2013). The study stated that a 10 mmHg reduction in systolic blood pressure is associated with a 22% reduction in the incidence of coronary heart disease and 41% stroke in RCT studies, as well as a 41-46% reduc-

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tion in cardiometabolic deaths in epidemiological studies (Danaei et al., 2013).

The prevalence of hypertension in Indonesia has increased from 25.8% in 2013 to 34.1% in 2018. The national report showed there were 8 provinces with hypertension prevalence above the national prevalence. Central Java Province ranked 4th with the highest prevalence of hypertension nationally with 37.6% (National Institute of Health Research and Development Ministry of Health of Indonesia, 2018). As for the Semarang City, hypertension was in the first rank with the highest cases in primary healthcare center (PHC) compared to other non-communicable diseases in the 45-65 year age group (Health Office of Semarang City, 2019).

Increased blood pressure is determined by many risk factors, both behavioral (poor consultation bahavior) and biological (increased cortisol, cardiovascular system, and immunological factors) (Israfil & Making, 2020; Pedersen et al., 2017). A well-known behavioral factor is the type A personality pattern, which is characterized by ambitiousness, aggressiveness, competitiveness, impatience, muscle tension, vigilance, fast speaking, cynicism, hostility, and increased potential for anger (Lin et al., 2018). Apart from type A, studies explained that there was a type D personality pattern that was associated with increased cortisol, stress risk, cardiovascular disease, essential hypertension, metabolic syndrome, and even death (Kupper & Denollet, 2018; Raykh et al., 2021; Steca et al., 2016). This personality type is the result of an investigation of the coping type / stress adjustment method by a male patient suffering from coronary heart disease. Type D personality is defined as the result of the interaction between negative affectivity (NA) and social inhibition (SI). People with this type are characterized by feelings of depression, anxiety, and stress (NA), as well as a fear of socializing with other people (SI). In addition, the hallmark of this type is to have fewer personal relationships with other people and to tend to feel less comfortable with strangers (Denollet et al., 2018).

The prevalence of type D personality in the general population ranges from 21% to 38.5% (Oliva et al., 2016). However, the prevalence of type D personality in hypertensive patients was higher than the general population, that was 53% of 732 hypertensive patients compared to 21% of 2508 controls from the general population (Steca et al., 2016). This is also confirmed by the subsequent finding that the prevalence of hypertension is higher in subjects with type D personality compared to subjects without type D personality,

which ranges from 18% to 49.9% in the general population (Denollet et al., 2018) and from 61% to 64.5% in patients with coronary heart disease (Kupper et al., 2013).

Although several studies have reported a strong association between type D personality and coronary heart disease (Denollet et al., 2018; Kupper & Denollet, 2018; Enatescu et al., 2021), only a few studies have explained the association between type D personality and essential hypertension (Oliva et al., 2016; Ringoir et al., 2014). In addition, there were inconsistencies in the results of previous studies which stated that there was an association between type D personality and essential hypertension (Oliva et al., 2016) and that there was no association (Ringoir et al., 2014). The aim of this study is to determine the role of type D personality on essential hypertension with case-control study in urban area in Semarang City, Indonesia.

## METHODS

This study was case-control study with 139 cases and 139 controls among 18-60 years old patients consulting at 37 primary healthcare centers (PHCs) in Semarang City, Indonesia. Cases were new patients diagnosed with essential hypertension from January 2020 to March 2021 and controls were new patients diagnosed with no essential hypertension, for the same period. We excluded patients diagnosed with diabetes mellitus, stroke, and serious mental illness, as well as patients had consulted at PHC in Semarang City prior to 2020. Sample was collected by stratified random sampling with proportional allocation according to essential hypertension case in each PHC.

Type D personality was assessed using DS-14 scale (Menon et al., 2019; Pah et al., 2019) which consisted of 14 Indonesian translated statements. The responses are divided into 5 scales, i.e. inappropriate: (0). slightly inappropriate; (1). neutral; (2). somewhat appropriate; (3). and appropriate; (4). The statement consists of 2 groups, i.e. NA and SI statement groups (range of each group: 0-28). The Indonesian DS-14 scale had been tested its validity and reliability on 30 subjects. Validity and reliability of the test results showed that the value of corrected item-total correlation of each item and Cronbach's Alpha > 0.36. It means the Indonesian DS-14 was valid and reliable to assess type D personality.

Several covariates that were also measured in this study were age, sex, family history of essential hypertension, obesity, alcohol consumption, smoking, physical activity, salt intake, and

Table 1. Sociodemographic and clinical characteristics of the case group (n=139) vs control group (n=139) in Semarang City, Indonesia

| | Case, n (%) | Control, n (%) | OR (95%CI) | p value |
|---|---|---|---|---|
| Type D personality | | | | |
| Yes | 89 (64.1) | 51 (36.7) | 3.07 (1.83-5.16) | <0.01 |
| No | 50 (35.9) | 88 (63.3) | Ref | - |
| Sex | | | | |
| Female | 87 (62.2) | 58 (41.7) | 2.34 (1.40-3.89) | <0.01 |
| Male | 52 (37.4) | 81 (58.3) | Ref | - |
| Family history | | | | |
| Yes | 80 (57.6) | 72 (52.2) | 1.24 (0.75-2.05) | 0.37 |
| No | 59 (42.4) | 66 (47.8) | Ref | - |
| Obesity | | | | |
| Yes | 75 (53.9) | 43 (69.1) | 2.62 (1.56-4.41) | <0.01 |
| No | 64 (46.1) | 96 (30.9) | Ref | - |
| Alcohol consumption | | | | |
| Yes | 2 (1.4) | 1 (0.7) | 2.01 (0.1-119.69) | 1.0[a] |
| No | 137 (98.6) | 138 (99.3) | Ref | - |
| Smoking | | | | |
| Smoker | 59 (42.5) | 34 (24.4) | 2.48 (1.41-4.37) | <0.01 |
| Ex-smoker | 17 (12.2) | 15 (10.8) | 1.62 (0.70-3.76) | 0.21 |
| Non-smoker | 63 (45.3) | 90 (64.8) | Ref | - |
| Physical activity | | | | |
| Low | 77 (55.4) | 50 (35.9) | 3.00 (1.56-5.48) | <0.01 |
| Moderate | 38 (27.3) | 41 (29.5) | 1.69 (0.84-3.43) | 0.11 |
| High | 24 (17.3) | 48 (34.6) | Ref | - |
| Salt intake | | | | |
| High | 68 (48.9) | 39 (28.1) | 2.46 (1.45-4.17) | <0.01 |
| Normal | 71 (51.1) | 100 (71.9) | Ref | - |
| Stress | | | | |
| Yes | 66 (47.5) | 56 (40.3) | 1.34 (0.81-2.21) | 0.23 |
| No | 73 (52.5) | 83 (59.7) | Ref | - |
| | Mean (SD) | Mean (SD) | | |
| Age | 47.9+9.4 | 43.5+10.6 | - | <0.01[b] |

[a]Analyzed with Fisher Exact Test
[b]Analyzed with Mann-Whitney Test

stress. We use some instruments to measure that covariates, i.e structured questionnaire to measure age, sex, family history of essential hypertension, obesity, alcohol consumption, and smoking, International Physical Activity Questionnaire Short Form (IPAQ-SF) to measure physical activity (Cleland et al., 2018), food frequency questionnaire to measure salt intake, and The Holmes and Rahe Stress Scale to measure stress (Gomboc et al., 2021). Collected data were analyzed using chi-square test to determine the association between type D personality and covariates with essential hypertension and logistic regression to determine the equation model among them.

This study was approved by Health Research Ethics Commission (HREC), Universitas Negeri Semarang, Indonesia (054/KEPK/EC/2019). Written individual informed consent was obtained from all subjects in this study.

## RESULTS AND DISCUSION

The sociodemographic and clinical characteristics of the case group versus control group are presented in Table 1. There were 139 cases and 139 controls with age mean of subjects were 47.9+9.4 in case group, 43.5+10.6 in control group, and 45.7+10.2 in both groups. There was a significant difference of age between case and control group (p<0.01). Female subject prevail in this study. The proportion of subjects with type D personality were 50.4% (42.1%-58.7%), whereas without type D personality were 49.6% (41.3%-57.9%). The prevalence of type D personality in the case group (64%; 95%CI: 55.9%-72.1%) was higher than in the control group (36.7%; 95%CI: 28.7%-44.7%). This finding confirm previous findings that showed the prevalence of type D personality in hypertensive and cardiovascular patients is higher than the general population (Denollet et al., 2018; Kupper & Denollet, 2018; Steca et al.,

Table 2. Multivariable analysis for essential hypertension in Semarang City, Indonesia (n=278)

| | Model 1 | Model 2 | Model 3 | Model 4 |
|---|---|---|---|---|
| | OR$^a$ (95% CI) | OR$^a$ (95% CI) | OR$^a$ (95% CI) | OR$^a$ (95% CI) |
| Type D personality | 3.03 (1.85-4.92) | 2.51 (1.49-4.25) | 2.34 (1.36-4.06) | 2.41 (1.32-4.41) |
| Stress | 1.25 (0.76-2.03) | 1.24 (0.76-2.05) | - | - |
| Sex | - | 1.67 (0.99-2.82) | 1.70 (0.99-2.95) | 2.30 (1.22-4.33) |
| Obesity | - | - | 2.44 (1.45-4.12) | 2.45 (1.39-4.31) |
| Salt intake | - | - | 2.35 (1.38-3.99) | 2.61 (1.46-4.65) |
| Smoking | - | - | - | 3.08 (1.65-5.77) |
| Physical activity | - | - | - | 2.39 (1.37-4.18) |
| Age | - | - | - | 1.04 (1.01-1.07) |
| n | 278 | 278 | 278 | 278 |
| Pseudo R$^2$ | 0.056 | 0.066 | 012 | 0.22 |

$^a$Adjusted OR (AdjOR)

2016). Family history of essential hypertension was more dominant in the case group, but on the contrary in the control group, subject without family history of essential hypertension was more dominant. Obesity was reported in less than one third of subject in the case group, conversely, in the case group, more subject whose body mass index (BMI) were categorized as obese. In alcohol comsuption, more than 95% of the subjects did not consume alcohol, both in the case and control groups. Subject categorized as smoker was not significantly different with non-smoker in the case group, contrariwise, non-smoker was 3 times more than smoker in the control group. Subject in the both group was more likely to do low physical activity. The proportion of subject in the control group who consumed high salt (> 5 grams/day) was one third of normal salt consumption, but in the case group, they were not much different. The proportion of non-stressed subject was higher in both groups than stressed subject.

Based on further analysis, Table 1 shows that type D personality and other covariates (sex, obesity, smoking, physical activity, salt intake, and age) were associated with essential hypertension (p value<0.05). Otherwise, family history, alcohol consumption, and stress were not shown to be significantly associated with essential hypertension. Based on the result from type D personality, the Odds Ratio (OR) was 3.07, which means that subjects who met type D personality had a 3.07 times higher risk of getting essential hypertension than those who did not meet type D personality. In sex, the OR was 2.34, which means that female subjects had a 2.34 times higher risk of getting essential hypertension than those who were male. The OR of obesity, smoking, physical activity, and salt intake were 2.62, 2.48, 3.00, and 2.46, respectively. The risk of getting essential hy-

pertension among people with obesity, smoker, people with low physical activity and high salt intake was almost three times higher than in people with normal BMI, non-smoker, and people with high physical activity and normal salt intake.

Further analysis with logistic regression was performed on covariates with p value < 0.25. Based on the analysis in Table 1, the covariates included are type D personality, sex, obesity, smoking, physical activity, salt intake, stress, and age. The results of multivariable analysis are presented in several models (model 1-4) in Table 2.

Model 1 is a multivariable analysis between type D personality and stress with essential hypertension. The analysis was carried out in order to determine the effect of stress on type D personality in predicting essential hypertension. From this analysis, it was found that the OR-crude in Table 1 (3.07) did not change significantly (AdjOR: 3.03) in Table 2 after adding stress to the model. This shows that the stress variable does not change the risk effect of essential hypertension among subject who has type D personality.

Model 2 is a multivariable analysis after including type D personality, sex, and stress. The analysis was carried out in order to determine the effect of sex and stress on type D personality in predicting essential hypertension. Based on the analysis of model 2, it was found that the AdjOR in model 1 (3.03) experienced a significant change (AdjOR in model 2: 2.51) after adding stress and sex to the model. These results indicates that sex was confunder and able to change the risk of type D personality and stress on essential hypertension.

Model 3 is a multivariable analysis after including the type D personality, sex, obesity, and salt intake. The analysis was conducted to

determine changes in the risk effect of essential hypertension by life style variables, in this case, obesity and salt intake among subject with type D personality. Sex were still included in the model because it had a role as confounder. Stress was excluded from model 3 because stress was not significantly associated in model 2 The result obtained indicates that type D personality has the OR of 2.34, after adjsuting for sex, obesity, and salt consumption.

Meanwhile, model 4 is the best model of the logistic regression equation, because it only contains covariates that have a p-value <0.05 and had highest pseudo $R^2$ of 0.22 compared to other models. It shows that subject with type D personality had a 2.41 times higher risk of getting essential hypertension after adjsuting for sex, obesity, salt intake, smoking, physical activity, and age.

This finding is consistent with several previous findings that suggest a strong association between type D personality and essential hypertension, coronary heart disease, cardiovascular disease, and metabolic syndrome (Kupper & Denollet, 2018; Majaluoma et al., 2020; Oliva et al., 2016; Raykh et al., 2021; Steca et al., 2016). The combination of high NA and SI is a strong predictor of health status and poor prognosis of heart conditions. The previous study was consistent in showing association between the severity of cardiovascular disease patients who have type D personality compared to those who are not type D. These findings are significantly related to the incidence of major adverse cardiac events (MACE) and health-related quality of life (HRQOL). In a cohort study, patients with cardiovascular disease who had type D personality had a 27 times greater risk of developing subsequent myocardial infarction, coronary artery bypass surgery, percutaneous coronary intervention, or cardiac death than patients without type D personality. Type D personality can reduce the quality of life and mental health status of a person not only in people with cardiovascular disease, but also in patients with endometrial, collateral, and lymphoma cancer, even after adjusting for depressive symptoms (Mols et al., 2012).

People with type D personality will have the risk of decreasing health status, including illness and death. In addition, they are at risk for post-traumatic stress and fatigue. Physiological hyperactivity, activation of the immune system, and inadequate response to cardiac medications are mechanisms that explain the disadvantages of type D personality (Beuwens et al., 2019). Type D personality is also associated with the onset of CHD among male and the combination of type

D personality and adult age is associated with a poor prognosis of CHD. Person with type D personality is at risk of having a group of psychological risk factors, such as depression, anxiety, irritability, and low self-esteem (Borkoles et al., 2018; Raykh et al., 2020).

In patients with cardiovascular disease, it has been studied that there is an association between type D personality and components of the metabolic syndrome. Studies on CHD patients show that there is an association between hypertension, hypercholesterolemia, and diabetes mellitus with type D personality (Kupper et al., 2013). Patients with hypertension (53%) have more personality type D than healthy people (19%)

Type D persoanlity in a person is relatively stable. The stability of type D personality systematically over a period of time. Study showed that the SI pattern did not change for 6 years, while the NA pattern changed over the same time. The conclusion of this study is that at the individual level, 22% of respondents experienced a change in personality from not type D to type D, or vice versa for 6 years (Romppel et al., 2012). Although type D personality is relatively stable, this does not mean that a person's personality cannot be changed. A person with type D personality has limited ability to cope with stress (Mols et al., 2012), so that psychological intervention can be carried out to improve coping skills. This ability is expected to reduce acute and chronic stress due to experience and improve pain management skills. In the future, these interventions are needed to study the extent of their effect on reducing the severity of reported complaints, reducing the perception of negative emotions, such as depression and anxiety, and increasing healthy behaviors, such as medication adherence among various groups of patients with type D personality (Mols et al., 2012).

## CONCLUSION

The prevalence of type D personality among subject with essential hypertension (64%; 95%CI: 55.9%-72.1%) is higher than subject without essential hypertension (36.7%; 95%CI: 28.7%-44.7%). Type D personality is found to be significantly associated with essential hypertension. Even after adjusting after adjsuting for sex, obesity, salt intake, smoking, physical activity, and age, the association is still statistically significant. One of the components of type D personality is SI. Therefore, parents can restrict screen time for family members, including children to socialize with other family members and friends. Further studies should be carried out to evaluate

the impact of early detection of type D personality on hypertension and other caridiovascular diseases prevention and treatment.

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# Gizi COVID-19 Bagi Remaja" Application as COVID-19 Prevention

FINAL GRADE

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GENERAL COMMENTS

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