Reduce Stroke Incidents with Tobacco Control (Risk Assessment of PAR Riskesdas 2013)

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ABSTRACT

Globally premature death due to cardiovascular disease and stroke continues increase, predicted many UN member countries cannot reach target of reducing premature death by 25% by 2025. Similar in Indonesia prevalence of stroke increased from 8.3 to 12.1 per mile population (Riskesdas,2007-2013), the proportion of deaths correlated with an increase of prevalence 15.84%, growing 4.39% in 2013 (IHME, 2007-2013). These situation in line with increasing prevalence of teenage smokers. Risk assessment (PAR) analysis using Riskesdas 2013 was carried out to finding out its impact on the incidence stroke, if exposure smoking was eliminated. We used 7859 stroke cases, 50.3% was men. Bivariate analysis to determine features of stroke risk factors ($p < 0.001$), we do multivariate analysis to obtain the prevalence rate and risk factor intervention models. Interventions on risk factors of tobacco consumption or hypertension are predicted to have an opportunity reduce incidence of stroke by 68% with PR 9.55. The target of reducing 100% of tobacco consumption predicted reduce 3031 cases of stroke, while reducing 40% of hypertension reduce 1212.Behavioural modification with a healthy lifestyle, stop tobacco consumption and preventing increase in novice smokers, are the main targets of the tobacco control intervention program in the community.
Keywords: risk assessment, tobacco consumption, population attributable risk, stroke

1. INTRODUCTION

Cardiovascular disease and stroke are the main causes of premature death in the world. The Global Burden of Disease project predicts premature death from cardiovascular disease and stroke (cardiocerebrovascular) is expected to increase from 5.9 million in 2013 to 7.8 million in 2025. If the trend continues, early deaths from cardiocerebrovascular disease will reach 60% in the country which is densely populated, including Southeast Asia. As a result, many UN member states will not meet the targets of the global action plan to address non-communicable diseases that have been set, namely the reduction of premature deaths from cardiocerebrovascular disease by 25% in 2025[1]. Based on Riskesdas data, the prevalence of stroke cases in Indonesia (2007-2013) increased from 8.3 to 12.1 per mile population. Stroke is also the main

or 113.52 (108.17-119.55) per 100,000 deaths. Even the representation in 2017 stroke is still the number one killer in Indonesia with an increase of 4.39% from 2013[2]. Smoking is a major risk factor for non-communicable diseases (NCD) including stroke. Although the prevalence of smokers in Indonesia (age ≥10 years) tends to decrease from 29.3% (Riskesdas 2013) and to 28.8% (Riskesdas 2018), but the cause of death in Indonesia, in 2007 is predicted to cause 15.84% of total deaths, and in 2013 increased to 17.99%, prevalence of adolescent smokers (10-18 years) has increased by 7.2% (years 2013) and reached 9.1% in 2018. This is one of the impacts of the cigarette industry by recruiting new customers of young Indonesian

smokers, who will be addicted to tobacco for their entire lives. To achieve the greatest impact on reducing deaths from stroke, it is recommended that interventions focus on key risk factors in each country. The main risk factors for cardiocerebrovascular disease are hypertension, less intake vegetables and fruits, lack of exercise, consumption of tobacco, and consumes alcohol. Reducing the prevalence of hypertension and tobacco consumption, will produce the greatest impact in reducing premature death from cardiocerebrovascular disease in most countries. It is recommended to create individual or combined risk factor intervention scenarios in order to get meaningful changes [3]. The results of interventions can be used as evidence data bases by policy makers, in planning joint actions across sectors, to reduce the incidence of mortality NCD especially cardiocerebrovascular cases.

2. METHOD

In this study the prevalence of stroke cases and related risk factors in the population were obtained from the health survey Riskesdas 2013, with a sample of 294,959 households (98.3% respond rate). Stroke cases with an operational definition of "having been diagnosed with a stroke by a health worker" were asked to household members aged over 15 years. Obtained 7859 cases of stroke with the proportion of cases in men 50.3%, women: 49.7%. Risk factor data related to stroke used; hypertension measured (systole ≥ 140 / diastole ≥ 90mmHg), obesity (BMI> 25), less consumption of vegetables & fruit (intake

<35 proportion / week), lack of physical activity (<150 minutes / week), smoking (ex-smoker, smoker active, not smoking) and food intake at risk of excess.

Risky food consumption behaviors, among others, the habit of consuming sweet / salty, fatty, fatty, burned / roasted, preserved, caffeinated, and flavored foods / drinks. Excessive or 'frequent' categories if a person's age over 10 years there were consumes the food once or more every day. Bivariate analysis was performed to identify risk factors that were determinants of stroke cases (p <0.001). Furthermore, stroke determinant risk factors was analyzed multivariate to determine the prevalence rate (PR) and get a risk factor combination model. The Population Attributable Risk or PAR method is a proportionate method of reducing disease or death in a population, which will occur if modifiable risk factor exposure is reduced, to the most ideal alternative exposure scenario. This analysis is often used for public health policy research, to estimate the cumulative impact of the distribution of various risk factors on a population, thus influencing the determination of priority programs and resource allocation. [3]. The reduction in the incidence of strokes is done by counterfactual simulations with various scenarios of a decrease of 10% to its equivalent and if possible, up to 100%. Potential risk factors for individual risk factors was analyzed for each risk factor or in groups, so that intervention efforts to control risk factors that are the most potential for reducing stroke cases can be chosen. The analysis was performed with Stata software.

3. RESULTS AND DISCUSSION

The identification of modifiable risk factors is very important to plan their reduction strategy. Modifiable risk factors can be divided into two namely as a medical condition and behavioral risk factors [4.5]. Hypertension is the most important risk factor that can be modified for stroke, with a strong, direct, linear, and simultaneous relationship between blood pressure and stroke [6]. The role of other risk factors that have often been proven in causing strokes other than hypertension are; diabetes, hyperlipidemias, and tobacco consumption [7].

Table 1. Determinants of Stroke Risk Factors

Risk Factors	stroke		non- stroke		total		p	PR
	n	%	n	%	n	%		(95%CI)
Hypertention								
yes (sis>140,dias>90)	4,172	2.65	153,164	97.35	157,336	100	<0.001	8.76 (8.28-9.26)
No	1,708	0.30	562,383	99.70	564,091	100		
Obese								
yes (IMT>25)	1,587	0.89	177,139	99.11	178,726	100	<0.001	1.12 (1.06-1.19)
No	4,293	0.79	538,408	99.21	542,701	100		
Diet low fruit & vegetable								
yes (<35portion/week)	5,742	0.81	70,4346	99.19	710,088	100	<0.001	0.66 (0.56-0.78)
No	138	1.22	11,201	98.78	11,339	100		
Low physical activity								
yes (<150mnt/week)	4,996	0.93	543,288	99.07	539,284	100	<0.001	1.91 (1.78-2.05)
No	884	0.49	181,259	99.51	182,143	100		
Diet non healthy food								
yes	2,729	0.73	369,933	99.27	372,662	100	<0.001	0.81 (0.77-0.85)
No	3,151	0.90	345,614	99.10	348,765	100		
Tobacco consumption								
former smoker	1,013	3.10	31,711	96.90	32,724	100	<0.001	3.94 (3.68-4.22)
active smoker	1,225	0.54	223,831	99.46	225,056	100	<0.001	0.69 (0.65-0.74)
non smoker	3,642	0.79	460,005	99.21	463,647	100		

Bivariate analysis of risk factors related to stroke (p <0.001) all risk factors are determinants of stroke (p <0.001). But the Prevalent Rate that affects stroke is hypertension PR 8.76 (95% CI: 8.26-9.26), former smoker PR 3.94 (95% CI: 3.68-4.22), lack of physical activity PR 1.9 (95% CI: 1.78-2.05). Hypertension and smoking and lack of physical activity, are the main risk factors that most influence the incidence of stroke cases in Indonesia.

Table 2. Combination of Risk Factors for Stroke in Indonesia in 2013

Hypertention	Low physical activity	Former smoke	Cases	Non- cases	Total cases	Prev	PR	PAR
(or) Yes	Yes	Yes	5650	576730	582380	0.01	5.86	0.79
Yes	Yes	No	5626	571764	577390	0.01	5.52	0.78
Yes	No	Yes	4457	173664	178121	0.025	9.55	0.68
No	Yes	Yes	5121	541782	546903	0.009	2.15	0.47
(and) Yes	Yes	Yes	627	8683	9310	0.067	9.13	0.09
Yes	Yes	No	3542	115688	119230	0.03	7.65	0.52
Yes	No	Yes	728	11211	11939	0.061	8.4	0.11
No	Yes	Yes	888	24217	25105	0.035	4.93	0.12
(Ref) No	No	No	230	138817	139047	0.002**	1	
SUM			5880	715547	721427	0.008***		

Table. 2 shows the results of modelling risk factors related to stroke (hypertension, smoking and lack of physical activity) if done individually for each risk factor or simultaneously. For each risk factor for hypertension or lack of physical activity or smoking, the proportion of the reduction in the incidence of potential stroke cases is if an individual intervenes for each risk factor, compared if the interventions are carried out simultaneously (the PAR value of the intervention for each risk factor "or" is higher than the intervention combined "and"). Modelling results show; It is predicted to decrease the most cases of stroke (79%) if hypertension is intervened or lack of physical activity or

smoking (PR 5.86). On the other hand, intervention risk factors for hypertension or smoking alone have potential reduced with PR 9.55 (68%). If a combined intervention or a combination of risk factors for hypertension and smoking is potential enough for its success with a PR value of 8.40, it is predicted that the impact of the reduction is relatively less (11%).
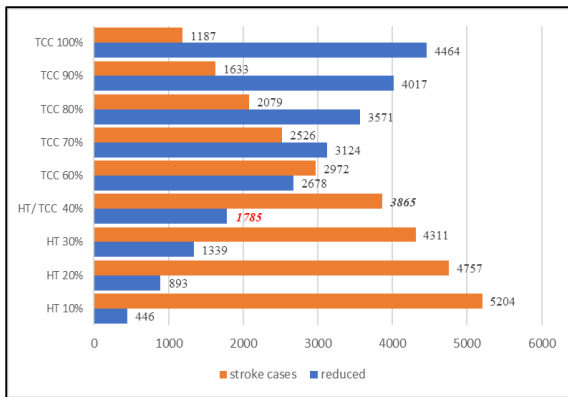

Figure 1. Intervention Scenario of Hypertension (HT) or Tobacco Control (TCC) for Stroke in 2013, PR. 5.86. PAR 0.79

Figure 1 shows the counterfactual variation in risk factors for hypertension or smoking. Modelling results show that these interventions are predicted to reduce 79% of the incidence of stroke or 5650 cases. The scenario of decreasing the incidence of stroke with hypertension (HT) interventions is 10%, 20%, 30% and 40%. While the reduction in the incidence of stroke with tobacco control / tobacco control (TCC) 60%, 70%, 80%, 90% and 100%. The higher the counterfactuals targeted, the more the number of strokes decreases.

Intervention Risk Factors for Tobacco Consumption

The theory of minimum exposure distribution states that not all exposure to risk factors can be zero, because physiologically it is not possible such as; body mass index and cholesterol. But for tobacco consumption can be at zero [8]. Intervention of risk factors for tobacco consumption with a target of 60% reduction from the maximum possible reduction (PAR 79%), predicted 2678 cases of stroke is reduced. The higher the target of reducing risk factors for tobacco consumption the higher the incidence of stroke is reduced. The target of reducing 100% of tobacco consumption is predicted to reduce 4464 cases of stroke. Tobacco consumption is a major risk factor for stroke, the risk of stroke is nearly twice that of the dose-response relationship consumption a year [9.10]. Tobacco consumption is predicted to contribute 15% of all deaths due to stroke per year. Quitting smoking quickly can reduce the risk of stroke, it is predicted that the risk can be eliminated after 2-4 years of stop smoking [11.12]. Efforts to help smokers quit should also be encouraged. Quitting smoking counselling programs must be expanded, especially to help teens who want to quit smoking. Passive

smoking is identified as an independent risk factor for stroke, exposure to second-hand smoke has a 30% risk of stroke after taking into account other risk factors related to stroke [13]. Therefore, Smoke Free Area policy in public places, especially where vulnerable people gatherings, must continue to be encouraged and its sustainability is monitored. A cohort study of modifiable etiological factors in stroke cases among people aged ≥ 55 years in Rotterdam 1990-1993 proved, that half of all respondents who suffered stroke were successfully prevented with treatment or decreased risk factors for smoking, hypertension, diabetes mellitus, atrial fibrillation, heart disease, and optimal obesity [14]. The cornerstone of a lifetime risk reduction in cardiovascular cases and stroke is behavior modification with a healthy lifestyle such as; do not consume or are exposed to tobacco, a healthy diet and regular exercise must begin in childhood and continue for a lifetime [15]. Reversal efforts that are against change are very suitable to be implemented with mass interventions, such as public health campaigns. These activities also cause other diseases such as coronary artery disease, heart failure, diabetes, dementia and others [16]. The MPOWER package consists a set of six key and most effective strategies for fighting the global tobacco epidemic: 1) Monitoring tobacco consumption and the effectiveness of preventive measures; 2) Protect people from tobacco smoke; 3) Offer help to quit tobacco use; 4) Warn about the dangers of tobacco; 5) Enforce bans on tobacco advertising, promotion and sponsorship; and 6) Raise taxes on tobacco. These six policies proven reduced the prevalence of smoking.

Furthermore, may reduce the burden of disease and the burden of premature death. Non-smoking area policies can have an impact on reducing the prevalence of 4-29%, only a full smoking band in all enclosed workplace including catering and drinking establishment, and all public building and transport. This policy must continue to be expanded in all district Indonesia. An increase in tobacco excise tax has the potential to reduce cigarette consumption, reduce the cost of health services, and increase state revenue. Raising retail cigarette prices has the potential to reduce 40% of smokers in school children and low economic groups. The data shows the prevalence of adolescent smokers is increasing, is strongly recommended to eliminate retail cigarette sales [17].

Intervention Risk Factors for Hypertension

The counterfactual model of hypertension interventions carried out with a target of 10% reduction is predicted to decrease the incidence of strokes by 446 cases, with a target of 20% reduction then predicted to decrease the incidence of stroke to 893cases, whereas with a target of 40% the reduction in stroke cases is 1785 cases. Secondary stroke prevention controls medical conditions such as hypertension and diabetes. In America the main risk factors for stroke are hypertension and diabetes, this is in accordance with the lifestyle of the people. The results of the calculation of PAR strokes for hypertension are 30% (95% CI: 12.5-47.4) and the resulting diabetes is 19.5% (95% CI: 12.4-26.5) [18]. American Heart Association

guidelines recommend for patients found to have pre-hypertension (systolic blood pressure 120 to 139 mm Hg or diastolic blood pressure 80 to 89 mm Hg), it is recommended to start regular blood pressure screening and lifestyle modification [19]. Interventions to be carried out with changes in population level behavior (such as reduction of salt or processed carbohydrates in food supplies), lifestyle changes, and pharmacological therapy. The results of a meta-analysis of 147 studies with a sample of 464,000 participants without a history of blood vessels or strokes, proved that a reduction in blood pressure of 10 mm Hg systolic or 5 mm Hg diastolic was associated with a reduction in stroke risk by 40 percent [20]. For individuals aged <60 years with hypertension (pressure blood> 140 mm Hg systolic or > 90 mm Hg diastolic) is recommended for medical therapy (taking antihypertensive medication in an invulnerable manner). For those aged > 60 who have no history of hypertension or diabetes or kidney failure, the JNC8 guidelines call for being able to control blood pressure <150/90 mm Hg [21].

4. CONCLUSION

• Based on Riskesdas 2013 data, the risk factors influencing the incidence of stroke in Indonesia (p <0.001) were hypertension, PR 8.76 (95% CI: 8.28-9.20), lack of physical activity PR 1.91 (95% CI: 1.78-2.05) and tobacco consumption (former smoker) PR 3.94 (95% CI: 3.68-4.22).

• Risk factor modelling results show individual interventions for each risk factor with a higher PAR value than combined risk factor interventions. Interventions on risk factors for tobacco consumption or hypertension are predicted to have an opportunity to reduce the incidence of stroke by 79% with PR 5.86.

• The target of reducing 100% of tobacco consumption is predicted may reduce 4464 incidences of stroke, while the target of reducing 40% of hypertension or smoker is predicted may reduce 1785 incidence of stroke. Behavioral modification with a healthy lifestyle, stop smoking and preventing the increase in novice smokers are the main targets of the tobacco control intervention program in the community.

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