

Effects of Smokers and Second Hand Smoke by Gender and Age on DALYs Stroke in Indonesia

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Abstract

Stroke is one of the causes of productive age losing time and work due to disability and death. This articles want to analyze the differences in the influence of smokers and second hand smoke by gender and age group to the value of DALYs stroke in Indonesia. This research is quantitative with cross-sectional design. It use BOD (Burden Of Disease) research data in 2018. The population is stroke sufferers. The sample is people who are exposed to cigarettes both as smokers and second hand smoke. Highest smokers DALYs value of stroke are found in ≥ 70 years old group. The value are 6041,33 for men and 810.82 for women. Lowest smokers DALYs value of stroke are found in <50 years old group. It value are 475.06 for men and 56,63 for women. Men DALYS value are 7,5 to 8,4 folds higher than women. Highest second hand smoke DALYs value of stroke are found in ≥ 70 years old group too. The value are 619.48 for men and 1322.03 for women. Lowest DALYs value of stroke are found in <50 years old group too. The value are 26.3 for men and 165.19 for women. Women DALYs value are 2,13 – 6,4 fold higher than men. Based on Kruskal-Wallis test result with CI level of 95% indicate significant difference for gender, age and individual exposed to smoke on DALYs stroke. There is a significant difference between sex, age, smoker and second hand smoke on DALYs stroke. Male smokers had higher DALYs than women. Female second hand smoke had higher DALYS than men.

Keywords: *Smoke, Smoker, DALYs, Stroke*

Introduction

Stroke is non infectious disease acutely attacking focal and global brain function with symptoms resulting in neurological deficit¹. Recently it remains one of main risk factors for morbidity and mortality in the world and is predicted to cause 4,4% year of life lost due to smoking related-morbidity (DALYs)². Smoking still becomes controversial. Beside it increases nation revenues and provides employment but there is also evidence that smoking is detrimental for health. Cigarette has harmful chemical components including alkaloid (nicotine), tar, carbon monoxide, nitrogen monoxide, nitrit compounds, chlorium, cadmium, sipermettrin, provenofos^{3,4}. Smoker has 6 folds of risk to have stroke in comparison with non smoker⁵.

Stroke is one of causing disease for disability and mortality⁶ even it ranks third highest in the world only surpassed by heart disease and cancer³. Patient

with stroke will loss significant part of his/her healthy or productive life. Public Health practitioners indicate stroke as global scale burdening disease which increase in last two decades. Stroke also burdens for each country and region⁷.

Based on Tati Suryati⁸, burden of disease can be measured by burden of disease method. The calculation uses Disability Adjusted Life Year (DALYs) method. Therefore, this research aimed to analyze difference between active smoker and second hand smoker (passive smoker) based on sex and age on stroke DALYs value in Indonesia in 2018.

Method

It is quantitative inferential research with cross sectional design. The population is all stroke patients with sample those who are exposed to smoke both as active smoker or second hand smokers. The data is from Global Burden of Diseases (GBD) research in 2018. This

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DALYs (*Disability Adjusted Life*) constitutes lost years rate for healthy life caused by early death (YLL) and disease or injury/disability (YLD). Years of life lost (YLL) is living year rate which is lost due to early death. Years lived with disability (YLD) is living year rate with non healthy condition (injury/disability)⁸.

Value 1 of DALYs indicates the lost of 1 productive lived year. Higher DALYs value indicates higher disease burden in the region. In this article, stroke DALYs related to active smoker and second hand smoker (passive smoker). It was stroke DALYs in 34 provinces in Indonesia based on sex and age.

Age group based was divided into 3 groups. They are age < 50 years old, age between 50 – < 70 years old,

and age ≥ 70 years old. Individuals in under 50 years old age group generally have good health. Individu between 50 - < 70 years old have more health problem, i.e : heart disease, stroke, prostate, gall stone. Individu at 70 years old and over have decreasing body function and other health problem. Individu in smoke exposed group were divided into two consisting active smoking and second hand smoke or passive smoker.

Data analysis used Kruskal Wallis test since the data was not normal distributed with Sig value or p = 0,000 < α=0,005. It also was not homogenous suitable Levene’s test score with Sig value or p =0,000 < α=0,005, as following:

Results

Kruskal Wallis analysis result indicated that there is difference between sex, age, smoke exposed group (active smoker and second hand smoker or passive smoker) on stroke DALYs as following:

Table 1. Kruskal-Wallis test Statistical Result on significance of gender, age, smoke exposed group difference on stroke DALYS in Indonesia in 2018

Grouping variabel	Analysis	DALYs Score(Convident interval level (CI= 95%) and α =5%	Conclusion
Gender	Chi-Square	7,801	At level CI level of 95% significant difference exists (P= 0,004 < α (5%), between gender and stroke DALYs stroke
	Df	1	
	Asymp. Sig.	0,004	
Age	Chi-Square	214,053	At CI level of 95%, significant difference exist (P= 0,000) < α (5%), between age group on stroke DALYs
	Df	2	
	Asymp. Sig.	,000	

Cont... Table 1. Kruskal-Wallis test Statistical Result on significance of gender, age, smoke exposed group difference on stroke DALYS in Indonesia in 2018

Smoke exposed (active Smoker dan second hand smoker)	Chi-Square	28,877	
	Df	1	
	Asymp. Sig.	,000	At CI level of CI 95%,, significant difference exists (P=0,000) < α (5%), between active smoker and antara perokok dan second hand smoker on stroke DALYs with CI 95%

Kruskal-Wallis test result with CI level of 95% indicate significant difference exist for gender ($p = 0,004 < \alpha = 5\%$), age ($p = 0,000 < \alpha = 5\%$) and individual exposed to smoke (active smoker and *second hand smoker*) $p = 0,000 < \alpha = 5\%$ on DALYs stroke .

Result of DALYs statistic descriptive of stroke based on group of individual exposed to smoke, age and gender in Indonesia in 2018 as indicated in Global Burden Disease (GBD) research in 2018 are following:

Table 2. DALYs value of stroke disease in active smoker and passive smoker based on Gender and Age groups in Indonesia year 2018

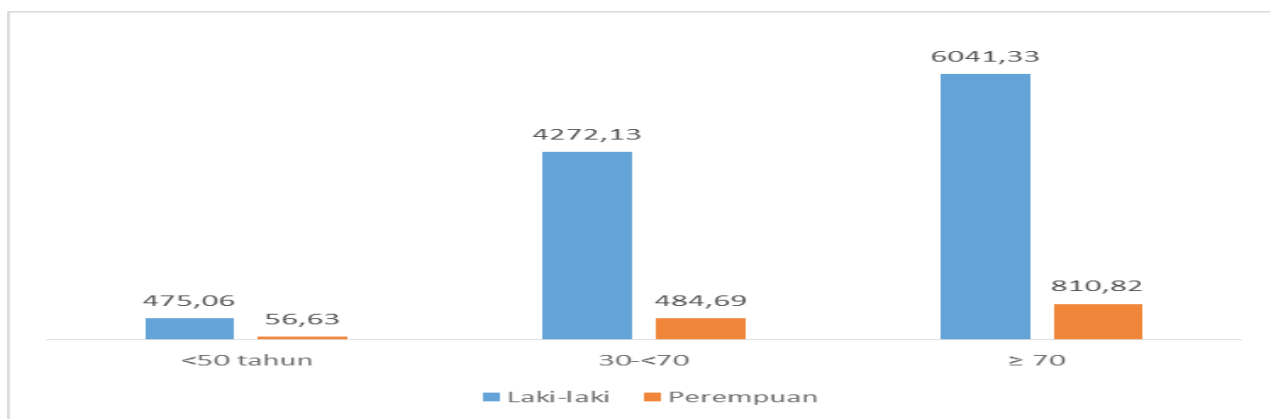
Type of smokers	Gender	Age (Year)	Mean DALYs stroke per 100.000 population	Std. Deviation
Active Smoker	Male	< 50	475.06	146.35
		50 - < 70	4272.13	1038.01
		≥ 70	6041.33	1155.92
	Female	< 50	56.63	50.34
		50 - < 70	484.69	305.07
		≥ 70	810.82	410.77
Passive Smoker (second hand smoker)	Male	< 50	26.31	8.96
		50 - < 70	298.73	76.17
		≥ 70	619.48	132.99
	Female	< 50	165.19	85.79
		50 - < 70	873.46	372.56
		≥ 70	1322.03	488.75

Smoker is not only found in men but also among women. The highest mean value of DALYs stroke among men smoker are found in ≥ 70 years old group. The mean value is 6041,33 per 100.000 population. The lowest mean value of DALYs stroke are found in < 50 years old group. The mean value is 475.06 per 100.000 population. The highest mean value of DALYs stroke among women smoker are also found in ≥ 70 years old group. The mean value is 810.82 per 100.000 population. The lowest mean value of DALYs stroke are also found in <50 years old group. The mean value is 56,63 per 100.000 population.

The highest mean value of DALYs stroke among men second hand smoke are found in ≥ 70 years old

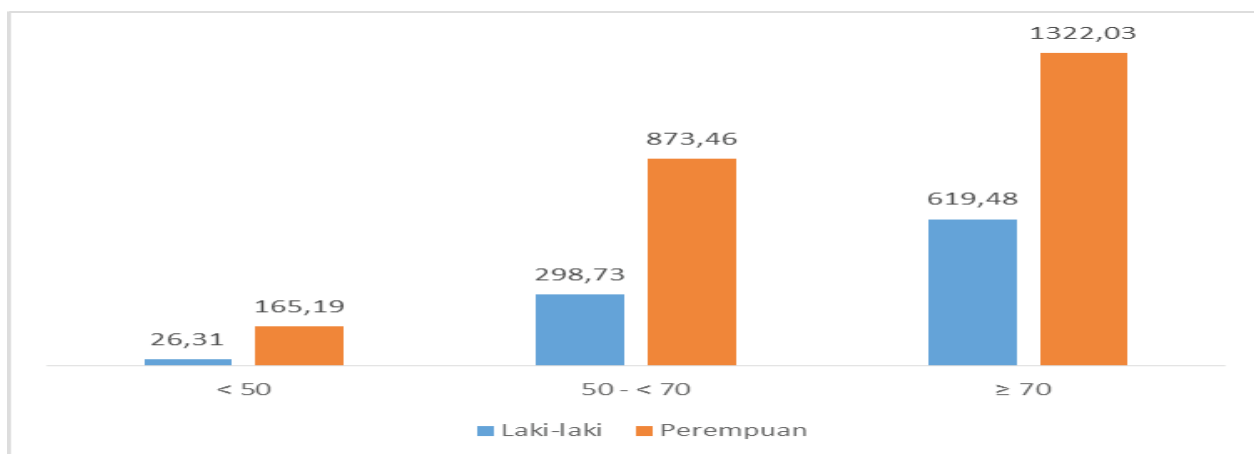
group. The mean value is 619.48 per 100.000 population. The lowest mean value of DALYs stroke are found in < 50 years old group. The mean value is 26.3 per 100.000 population. The highest mean value of DALYs stroke among women second hand smoke are found in ≥ 70 years old group. The mean value is 1322.03 per 100.000 population. The lowest mean value of DALYs stroke are also found in < 50 years old group. The mean value is 165.19 per 100.000 population.

Graphic 1 indicates comparison of DALYs value due to stroke as smoker at age ≥ 70 indicate that men have 7,5 folds higher than women. At <50 years old group indicates that men have 8,4 folds higher than women as shown in following table.



Graphic 1. Score of DALYs mean for Stroke disease in Smokers based on Gender and Age in Indonesia year 2017

The graphic 2 is shown the comparison of Stroke DALYs value of second hand smoke in ≥ 70 years old age group indicate that women have 2.13 folds higher than men. At <50 years old group indicates that women have 6,4 folds higher than men as shown in following table.



Graphic 2. DALYs mean score of Stroke on Second Hand Smoker based on gender and Age in Indonesia year 2018

Discussion

Cigarette problem along economy and health continuum has not been solved yet. Cigarette industry doesn't only support economy revenue but also create employment^{3,4}

To sustain and increase the smoker number, industry promotes advertisement in printed and electronic media that depict a smoker man as luxurious, powerful, strong and rich. The advertisements were dominated by men, however smoking among women show increase. The ban of cigarette add that involves under 18 years old group has been passed however smoking among children aged 10 years old up in Indonesia keep increasing and according to Essential Health Research in 2018, there was 24,3%⁹. Meanwhile, to decrease smoker number, government educates public through add simultaneously with the cigarette adds where every commercial adds was concluded by health message. Health Ministry also promotes in every cigarette package about the danger of smoking for health both for men and women and also for the environment¹⁰

Result of GDR research proved that many people in Indonesia were still smoking both men and women. In South Sulawesi province, cigarette has become necessity for men hence the budget for smoking constitutes 3 biggest spending in household in addition to meal (rice and cassava) and protein (fish and egg). Each day they can smoke 10 to 20 cigarettes in average¹¹. Indonesian smokers consume average 12,8 cigarettes. In global, smokers can consume 5 – 20 cigarettes a day (*cigarettes per day* atau CPD)¹².

Globally smoking men consumes 49% or higher than women who consume 11% and the number increase annually(12). In Indonesia, men smokers were scored 47,5% or higher than women with only 1,1% and the result of Riskesdas (Essential Health Research) in 2018 stated that men smokers were scored 47,3% or higher than women with only 1.2%(9). Men smokers according to survey result were scored 73,7% as smoking fathers whereas smoking mothers were only 0,5%. Health consequence from smoking father in household constitutes significant influencing factor with $p = 0,0001$ on the low body weight in children (CM Best) and significantly correlates to stress at work ($p = 0,004$) and musculoskeletal problem ($p=0,023$).

Stroke case in Indonesia according to Riskesdas result in 2018 were 10,9% and 11% occurred in men and 10,9% in women. One of causing factor in stroke based on this research was due to smoking cigarette exposure(12). Stroke is non infectious disease which can result in disability and mortality or DALYs^{6,13}. Globally there are 25,7 millions people with stroke, 6,5 millions death related to stroke and 113 millions people living with stroke related disability. Stroke is known as acute cerebrovascular incidence, it closely relates to brain tissue injury as main cause of mortality and disability in the world^{14,15}.

Gender is important part in GDR research as basic data to calculate the burden of stroke due to smoking, since in addition to ethnic group, gender is risk factor for stroke incidence (Martin, 2016). The result showed that there is significant difference ($P = 0,004 < \alpha = 5\%$) among gender on DALYs of smoking related stroke. Relative risk to have stroke in men and women who smoke 1 cigarette a day was men would have 1.25 to 1.38 fold to have stroke compared with non smokers. In Indonesia, DALYs of smoking related stroke in men were found highest in West Nusa Tenggara, Southeast Sulawesi, Papua and lowest scores were found in North Kalimantan, Jakarta, Gorontalo¹².

Smoking women have stroke risk 1,31 to 1,52 fold compared with non smoking women. In Indonesia, DALYs of smoking related stroke in women were found highest in Papua, West Kalimantan, Southeast Sulawesi, Jambi, and lowest score were found in North Kalimantan, East Java, Yogyakarta, North Sumatra, East Nusa Tenggara. Men and women who smoke 5 cigarette a day have relative risk (RR) to have stroke 1,30-1,42 fold (men) and women have 1,44-1,48 fold compared with non smokers. Men and women who smoke 20 cigarettes a day have relative risk to have stroke 1,64-1,82 fold and in men and women were 2,16 - 2,75 fold¹². Based on gender, globally there is DALYs difference due to stroke where highest score found in Bulgaria, Macedonia, Georgia, China, and North Korea (11% –12%)⁷.

Age becomes important part in GDR research to analyze burden of smoking related stroke since one of 10 factors to cause stroke in the world is age⁶. Data collection of respondent age is important to identify the age for first time smoking and the age of first time having

stroke. Youngest smoker age in Indonesia was 10 – 14 years old accounting for 0.7% and highest 45 – 49 years old or 29,6%. Analysis result in this research indicates significant difference ($P = 0,000 < \alpha = 5\%$) among age group in stroke case. Result from other research also indicated the difference of age factor on stroke risk and mortality. Stroke case in Indonesia is found highest in 75 years old up group constituting 50,2% and globally age of 70 years old up causes increased stroke risk and mortality compared with younger age¹⁶.

Research in 32 countries indicated that there is more significant relationship ($p < 0,0001$) between smoke exposed, heart disease, diabetes mellitus and stroke than hypertension⁶. Unhealthy life style like smoking, according to the result causes increased heart attack and stroke incidences¹⁷. Despite fact that stroke causes mortality and disability¹⁵, smoking habit has not been decreasing in public even show an increase¹².

Smoking cigarette is influencing factor on stroke case that causes disability and mortality (DALYs) and exposed to smoking becomes mortality causes of 85-90% in chronic lung disease while second hand smoking in women causes higher DALY of stroke than in men¹⁸. Non smokers who are frequently exposed to smoking in the room is called second hand smoker¹⁸ and they are vulnerable group to have stroke^{4,18}.

Highest second hand smoke in men in Indonesia is found in East Kalimantan, North Sulawesi, Papua and the lowest is found in North Kalimantan, South Sulawesi, Gorontalo. Meanwhile in women total DALYs mean score for stroke per 100.000 population were found highest in North Maluku, Maluku, West Papua and lowest score were found in North Kalimantan, West Java and North Sumatra.. based on result of stroke DALYs calculation, it is stated that second hand smokers is one risk factor that can cause stroke DALYs to increase¹⁹. DALYs of stroke due to second hand smoker were found highest in women aged ≥ 70 years old of 1322.03 per 100.000 population. Research in New Zealand found that second hand smokers exposed to smoking in workplace caused 100 mortalities which could be avoided per year from lung cancer, coronary heart disease and stroke in collective⁵

Second hand smoker statistically showed significant correlation as risk factor to have stroke DALYs¹⁹.

This research indicated significant difference on stroke DALYs score between active smoker group and second hand smoker group with $P = 0,000 < \alpha = 5\%$. Smoking is main risk factor in survey on disease burden. It caused five millions of mortality (8,8%) in world population and it also caused 4,1% lived year to loss due to disability in the world². Descriptive statistic analysis indicate that the highest DALYs stroke both as active smokers and second hand is found in ≥ 70 years old group.

DALYs score in men tend to be higher than in women since men who smoke cigarette were 47,5% more than women with only 1,1%¹. Other research indicated that smoker men have 7.3 fold higher to have stroke risk than non smoking men. Women who expose to smoking cigarette have scored only 1.2 fold higher to have stroke risk than non smoking women⁵. Duration of smoking cigarette over 20 year will have higher risk to have cardiovascular problem than those who have been smoking in less 20 years duration²⁰.

Conclusion

The effect of cigarette exposure can cause an increase in stroke DALYs. Statistically, there are significant differences between sex, age groups and between smokers and second hand smokers. The highest DALYs stroke of smokers was found in men aged ≥ 70 years, with the ratio of DALYs strokes of men 7.5 times greater than the DALYs stroke value of women.

The highest DALYs stroke on second hand smoke was found in women aged ≥ 70 years, with a female ratio of 6.3 times greater DALYs stroke compared with men.

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