

Comparison the level of standard deviation of N-N interval (SDNN) among adolescent in non smokers and smokers in Yogyakarta

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Original Article

ABSTRACT

ARTICLE INFO

Keywords:

Smoking,
standard deviation of N-N interval level,
Autonomic Nervous System

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DOI : 10.20885/JKKI.Vol9.Iss1.art6

History:

Received: June 19, 2017
Accepted: April 24, 2018
Online: April 30, 2018

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Background: Smoking has a negative impact on health. It makes an imbalance of the autonomic nervous system (ANS). It influenced the standard deviation of N-N interval (SDNN). SDNN has a duty as indicator for ANS controlled, consequently, SDNN in smokers is lower than non smokers because of ANS imbalance. Therefore, smokers have high risk for non communicable disease (NCD) in the future.

Objective: This research's purpose was to know the comparison of SDNN level among smokers and non smokers adolescent.

Methods: This research was non-experimental study with descriptive comparative design and cross sectional approach. The samples divided into 2 groups with each of group consists of 20 students. They were chose by purposive sampling techniques. SDNN level was measured by electrocardiogram (ECG) for 5 minutes with the provision that they should no tea, caffeine, alcohol consumption and no heavy exercise within 2 hours before data collected, feel free from desire to go to bathroom, feeling relax when data collection were performed. The data was analyzed by Mann Whitney test.

Results: There was a significant difference of between smokers' SDNN and non smokers' with $p= 0.038$ ($p<0.05$). Smokers' SDNN was lower than non smokers'.

Conclusion: Smokers' SDNN level was lower than non smokers'.

Latar Belakang: Merokok mempunyai dampak negative terhadap kesehatan. Hal tersebut dapat membuat sistem saraf otonom menjadi tidak seimbang. Ketidakseimbangan saraf otonom dapat mempengaruhi standard deviation of N-N interval (SDNN). Tingkat SDNN berperan dalam kontrol sistem saraf otonom. Akibatnya SDNN perokok lebih rendah dibandingkan dengan yang tidak merokok, sehingga pada perokok mempunyai resiko lebih besar terhadap penyakit non communicable diseases (NCD) dikemudian hari.

Tujuan: Tujuan dari penelitian ini adalah untuk mengetahui perbedaan tingkat SDNN remaja perokok dengan yang bukan perokok.

Metode: Sampel dibagi menjadi 2 kelompok yang terdiri atas 20 sampel perokok dan 20 sampel bukan perokok. Sampel dipilih dengan menggunakan teknik purposive sampling. SDNN diukur dengan menggunakan elektrokardiografi (EKG) yang direkam selama 5 menit. Saat sebelum perekaman EKG, sampel diinformasikan untuk tidak mengkonsumsi teh, makanan/minuman berkafein atau alkohol dalam 2 jam sebelum perekaman EKG. Selain itu dalam 2 jam terakhir dilarang melakukan aktivitas berat. Uji statistik menggunakan Mann Whitney.

Hasil: Nilai rerata dan standar deviasi pada kelompok tidak perokok 64.3 ± 3.31 dan kelompok perokok

52.35 ± 5.54. Hasil uji statistik dengan Mann Whitney test $p= 0.038$ ($p<0.05$) yang artinya terdapat perbedaan tingkat SDNN pada kelompok perokok dan kelompok tidak perokok.

Kesimpulan: Nilai rerata SDNN pada perokok lebih rendah dibandingkan tidak perokok.

INTRODUCTION

Smoking is one of the unhealthy life style which leads to the risk for cardiac sudden death and non communicable diseases (NCD). In the developing and developed countries, the number of smokers are rising by 2.1% and 1.1% per year, respectively.¹ In Indonesia, about 67.4% of men smoke and 4.5 % of women smoke actively.² The highest number of smokers in Indonesia aged 20-24 years old was 27.2% and 15-19 years old 11.2%.³ Those covered students who are a group of early and late adolescents aged 18-24 years old. Unfortunately, one of students is the nursing students who will be a healthcare providers, deliver education on tobacco use and support the smokers in order to change behaviour and lifestyle.

Recently, the object of the study is to discuss about NCD especially cardiovascular diseases which caused by smoking. However, the study did not discuss about the screening of people whose have high risk in NCD especially cardiovascular diseases in the future. Smoking has a risk factor for NCD especially cardiovascular diseases. Chronic smoking habits increased risk for ischemic heart diseases and cardiac sudden death in the future.⁴ Cigarette has chemical substances which has effect to increase blood pressure and heart rate by hyperactivity of sympathetic nervous system (SNS) of heart rate variability (HRV).⁵

HRV is the physiologist phenomenon which reflected the autonomic control indicators and the cardiac prosperit.⁶ It has utility to assess the risk for cardiac sudden death in a future. Accordingly, higher HRV reflected the wealth of cardiac function, however lower HRV indicated the poor of cardiac function.⁴ Heart rate variability have 2 domains, include the frequency domain and time domain.

Chronic hyperactivity of SNS made an

imbalance of autonomic nervous system (ANS) Indicator of ANS imbalances could be seen from hyperactivity of SNS (Harte and Meston, 2013).⁴ Standard deviation of N-N interval was a part from HRV which has role as indicator for ANS controlled. Therefore, the number of SDNN could measure the risk for cardiac sudden death with variation N-N intervals.⁷ The higher HRV revealed a good ANS and cardiovascular system, however lower HRV revealed a poor cardiovascular system.⁶ Because of SDNN was a part of HRV so the higher level of SDNN revealed a good ANS and cardiovascular system and lower SDNN revealed a poor cardiovascular system. In smokers, SDNN could be lower than non-smokers. It is caused by the effect of cigarette which could make hyperactivity of SNS and ANS imbalanced.

Because the HRV seldom be used to screening for cardiovascular prosperity and adolescents, the highest smokers in Yogyakarta, have high risk for NCD in the future, the purpose for this study was to evaluate the comparison of SDNN among non smokers and smokers adolescent in nursing students in Yogyakarta.

METHODS

This study was non-experimental study. The research samples were divided into two groups using purposive technique sampling. The populations are 124 nursing students and 20 of them are smokers. The criteria inclusion for the smokers groups are active smokers and the age range considered was 18-24 years old, agree to be participant. Hence, for non-smokers the criteria inclusions are non-smokers and the age range considered was 18-24 years old, agree to be participant. They were 20 smoking nursing students. The participants for smokers group are total sampling and for non-smokers the same amount with smokers group. The adolescent age range considered was 18-24 years old. This study obtained approval from the ethic commission of Faculty of Medicine and Health Sciences Universitas Muhammadiyah Yogyakarta (approval letter number 135/EP-FKIK-UMY/IV/2016). Before data collection,

the participants received information about the research and signed written consent in the paper.

The participant were informed to have last meal is 2 hours before experiment, abstinence from tea, caffeine and alcohol consumption.⁸ The participant should free from desire to go to bathroom before executed 8 and no heavy activity at least 2 hours before. They should be

in relax condition and sit in quite room.⁹

SDNN were measured by 12 leads ECG for 5 minutes. The assessment was conducted on May 2016 by researcher alone. Then, SDNN level was counted by N to N interval (Figure 1) and analysis by the formula (Figure 2). The ranges of SDNN interpretation were (poor < 19 ms; less 20-34 ms; good 35-49; excellent > 50 ms). The data

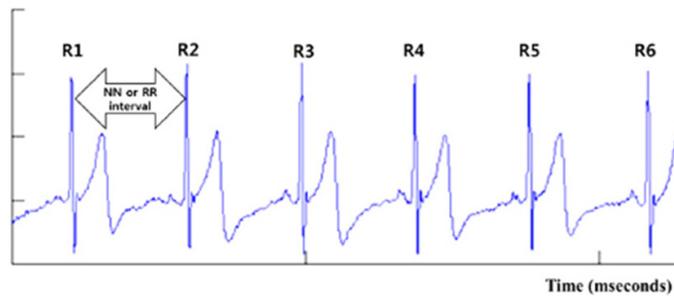


Figure 1. N-N interval¹⁰

$$SDNN = \sqrt{\frac{1}{N} \sum_{n=2}^N [(I(n) - 1)^2]}$$

Figure 1. SDNN Formula¹¹

was analyzed by Mann Whitley test to compare smokers' and non-smokers' SDNN level.

RESULT

Table 1 shown the level of SDNN in adolescent non-smokers and smokers. Overall the most of

the adolescent non-smokers and smokers have an excellent level of SDNN with mean 64.3 ± 3.31 and 52.35 ± 5.54. The result revealed that a non-smoker has a good SDNN. Therefore, they have lower risk factor for cardiac sudden death. Hence, overall the most of adolescent smokers

Table 1. SDNN level in non-smokers and smoker's adolescent in nursing students

SDNN nonsmokers	n	Mean ± SD	Percentage (%)	SDNN smokers	n	Mean ± SD	Percentage (%)
Excellent	20	64.3 ± 3.31	100	Excellent	16	54.31 ± 2.54	80
Good	-	-	-	Good	3	48.33 ± 1.15	15
Less	-	-	-	Less	1	33 ± 1	5
Poor	-	-	-	Poor	-	-	-
Total	20	64.3 ± 3.31	100	Total	20	52.35 ± 5.54	100

has an excellent level of SDNN. However, three of smokers have a good level and the one smoker has a less level of SDNN.

The comparison between SDNN non-smokers and smokers shown in Table 2. There were significant differences of SDNN among adolescent

Table 2. Mann Whitney test for levels of SDNN among adolescent non-smokers and smokers in Yogyakarta

The comparison of SDNN among smokers and non-smokers	Mean \pm SD nonsmokers	Mean \pm SD smokers	P value
	64.3 \pm 3.31	52.35 \pm 5.54	0.03

non-smokers and smokers with p value= 0.03 ($p < 0.05$). The level of SDNN nonsmokers was higher than smokers.

DISCUSSION

This study revealed that almost of non-smokers adolescent have high levels of SDNN (Table 1). It means that they have a good ANS. Therefore, the autonomic function and stress adaptability still in a good performance in adolescent non-smokers. Another study revealed that non-smokers have the high level of HRV.¹² The higher HRV the risk for cardiovascular diseases in non-smokers was lower than smokers.¹¹ Then, the risk for cardiac sudden death was decrease in the future. In the smokers group, this study revealed that smokers have a good level of SDNN (Table 1). Almost of the smokers still have good levels; however one sample has a lower SDNN. That's happened because the adolescent still young, therefore they still have a good SDNN. From another study, age was one of the factors influenced SDNN or HRV. The level of HRV was lower in aging than younger people.¹³ Therefore, the younger people the higher level of HRV. This study was done in adolescent smokers. Consequently, the adolescent smokers have a good level of SDNN.

Based on Mann Whitney test the p value= 0.03 ($p < 0.05$, Table 2). It means that there was a difference of SDNN between smokers and non-smokers adolescent. SDNN in smokers adolescent was lower than non-smokers with mean \pm SD are 64.3 \pm 3.31 and 52.35 \pm 5.54 respectively (Table 2). The mean of SDNN in smokers' adolescent still have a good level but if they compared with non-smokers they have lower SDNN. Therefore, adolescent smokers have higher risk for cardiac sudden death than adolescent nonsmokers.

Cigarette has chemical substances which has role to increase blood pressure and heart rate by hyperactivity of SNS they also could make hyperactivity of sympathetic nervous system.⁴⁻⁵ smokers' adolescent have higher risk for cardiac sudden death than non-smokers with lower SDNN.

CONCLUSION

SDNN level of non-smokers higher than smokers adolescent. Consequently, non-smoker adolescent has the lower risk for NCD in the future than smokers.

CONFLICT OF INTEREST

We declare there is no conflict of interest

ACKNOWLEDGEMENT

This project financially supported by research department school of Nursing Faculty of Medicine and Health Sciences Universitas Muhammadiyah Yogyakarta. We would like to thanks for Mrs. Shanti Wardaningsih, Ph.D as coordinator of Research Department, Mr. Moh. Afandi, MAN as skills laboratory coordinator, Mr. Muhammad Fahrurozy as research assistance.

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