ASSOCIATION BETWEEN HEART RATE VARIABILITY AND ARTERIAL STIFFNESS IN MEDICAL STUDENTS

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Abstract. *The purpose of this study is to examine the association between HRV and arterial stiffness in medical students at UPN Veteran Jakarta; Methods: This study is a quantitative study with observational analytic method using cross-sectional design and stratified random sampling thus obtaining a total sample of 57 students who have met the criteria. Body fat was seen based on the categories of Body Mass Index (BMI), visceral fat, and Body Fat Percentages (BFP) which are analyzed using the Bioelectrical Impedance Analysis (BIA) method. HRV and aretrial stiffness were analyze used Standard Deviation of All N-N Intervals (SDNN) parameter and Pulse wave velocitiy with HRV Analyzer. Data were analyzed by Chi-Square test and Fisher Exact Test as an alternative; Results: There was a weak correlation between HRV and arterial stiffness (r: 0.108); Conclusion: There was no relationship between HRV and arterial stiffness.*

Keywords*: Arterial stiffness; Cardiovascular ;Heart Rate Variability; Medical students.*

Abstrak. *Tujuan penelitian ini adalah untuk mengkaji hubungan antara HRV dan kekakuan arteri pada mahasiswa kedokteran di UPN Veteran Jakarta; Metode: Penelitian ini merupakan studi kuantitatif dengan metode analitik observasional menggunakan desain cross-sectional dan sampling acak berstrata, sehingga diperoleh sampel total sebanyak 57 mahasiswa yang memenuhi kriteria. Persentase lemak tubuh diukur berdasarkan kategori Indeks Massa Tubuh (BMI), lemak visceral, dan Persentase Lemak Tubuh (BFP) yang dianalisis menggunakan metode Analisis Impedansi Bioelektrik (BIA). HRV dan kekakuan arteri dianalisis menggunakan parameter Standar Deviasi Seluruh Interval N-N (SDNN) dan Kecepatan Gelombang Pulsa dengan HRV Analyzer. Data dianalisis menggunakan uji Chi-Square dan uji Fisher Exact sebagai alternatif; Hasil: Terdapat korelasi lemah antara HRV dan kekakuan arteri (r: 0.108); Kesimpulan: Tidak terdapat hubungan antara HRV dan kekakuan arteri.*

Kata kunci: *Kekakuan arteri; Kardiovaskular; Variabilitas Detak Jantung; Mahasiswa kedokteran.*

1. Introduction

Cardiovascular disease in young adults has increased over the past few decades. Risk factors for these events include lifestyle factors such as smoking and the consumption of unhealthy foods. [1]

Heart rate variability is crucial for assessing the function of the autonomic nervous system. HRV measurement of the intervals between consecutive heartbeats provides insight into the balance between the sympathetic and parasympathetic systems. [2,3]

Medical students have a relatively high risk of HRV results because of their stress factors. [2] an optimal level of HRV is associated with health and good autonomic condition. [4] Autonomic dysfunction is inversely related to arterial stiffness. [5] Reduced HRV will increase arterial stiffness. [6]

Arterial stiffness is a process that can be accelerated by risk factors such as high blood pressure, hyperglycemia, obesity, and chronic inflammation. Arterial stiffness is prone to be a manifestation of cardiovascular disease. [7]

2. Methods

This type of research is quantitative research with observational analytic method using cross-sectional design and using primary data. The population of this study were active students of the medical faculty of the Pembangunan Nasional Veteran Jakarta University in the second, third, and fourth years. Exclusion was made if the respondents had acute or chronic cardiovascular disorders, both due to congenital and acquired diseases (hypertension, heart valve disorders, arrhythmias, and so on), had chronic respiratory history disorders (Chronic Obstructive Pulmonary Disease and/or had a history of tuberculosis), diagnosed by a doctor suffering from psychiatric disorders, were taking drugs that affect the autonomic system (adrenergic, anti-adrenergic, cholinergic, and anti-cholinergic), were consuming alcohol and drugs. Also, not smoking and consuming caffeine for 2 hours before the study.

Heart Rate Variability analysis using Heart Rate Variability (HRV) Analyzer (SA-3000P) to see fluctuations in the time interval between heartbeats. The examination was conducted with the respondent removing metal accessories and sitting comfortably with the HRV sensor clipped to the index finger of the left hand. HRV measurement is a time domain with the SDNN parameter, which is the gold standard in medical diagnosis for cardiovascular disease risk when recorded for more than 24 hours. SDNN numbers more than 50 indicate a danger to health, and those <50 are unhealthy. We also use PVW data for interpreting arterial stiffness.

Analysis of the relationship between body fat and heart rate variability was performed using the Spearman test.

3. Result And Discussion

The study was conducted on 57 subjects who met the inclusion and exclusion criteria. The data used were primary data. The majority of subjects (36.8%) were 20 years old, and more than half of the subjects (66.7%) were female. More detailed subject characteristics are presented in Table 1 below.

Table 1. Distribution of Respondent Characteristics

Characteristic	Frequency (n)	Persentage (%)
	Age	
18 yo	4	7
19 yo	19	33.3
20 yo	21	36.8
21 yo	10	17.5
22 yo	3	5.3
	Gender	
Laki-laki	19	33.3
Perempuan	38	66.7
	HRV	
At risk	23	40.4
Not risk	34	59.6
Arterial stiffness		
Sub-optimal	31	53.4
Normal	26	47.6

The distribution of respondents had HRV in the at-risk and not at-risk, as many as 23 (40.4%) and 34 (59.6%). Subjects who have suboptimal arterial stiffness 31 (53.4%). The Spearman correlation test result shows a weak correlation between HRV result and arterial stiffness (r: 0.108)

Many previous studies have shown reduced in HRV is associated with arterial stiffness and leads to cardiovascular risk. The other study shows that autonomic dysfunction is related to cardiovascular disease. However, HRV alone cannot describe the risk of arterial stiffness; other metabolic conditions, such as hyperglycemia, high blood pressure, and other metabolic diseases, can be other factors associated with arterial stiffness. 3,5–10

4. Conclussion

Our study results show that most students have sub-optimal arterial stiffness that can be related to other factors. Sedentary lifestyle, poor dietary habits (high glucose and high-fat diet) can be factors related to sub-optimal arterial stiffness in medical students.7

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