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Atherosclerotic Cardiovascular Disease (ASCVD) risk assesment among healthy Indonesian Navy Personnel in East Java, Indonesia

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ABSTRACT

Indonesia, as the largest archipelagic country, has a military population of its own. Atherosclerotic Cardiovascular Disease (ASCVD) are common in in Indonesian Navy personnel populations, and recent studies reported an increasing ofits prevalence.However, the data on specific navy military populations are still limited. This study aims to assess ASCVD risk on Indonesian navy personnel. This study use yearly medical check-up data of the Indonesian navy with high rank (fleet commander) aged 25-60 years old in period of January-August 2023. Those who already diagnosed with coronary artery disease were excluded. We use Framingham risk score and EUROS II Score to assess the ASCVD risk among samples. A total of 503 samples were recruited, 474 were male. Mean of age was 45 y.o, predominantly they were active smoker (64,8%) and overweight (44,5%). Among men's population, the Framingham risk score shows almost half of the samples are at medium risk of ASCVD (40,16%), while a small percentage (17,3%) are at high risk as well as EuroSCORE II show remarkbly 62,21% of high ASCVD risk. The medium to high ASCVD risk among Indonesian Navy personnel need further attention and evaluation. A failure to give a decent preventive intervention may increase the burden of ASCVD in the future.

Keywords : ASCVD, Framingham risk score, Coronary Artery Disease, Navy Personnel, Indonesia

INTRODUCTION

Atherosclerotic cardiovascular disease (ASCVD) become a very problematic condition both in developed and developing countries. ASCVD incidence reached 422 million cases and 17 million deaths globally in 2015, causing nearly half of the 36 million deaths as a noncommunicable disease.(Roth et al., 2020)Indonesiais the largest archipelagic country in the world and is home to 260 million people. With so many islands under their governance, Indonesia has a large number of naviesand a military population of its own.Similar to the civilian population, the increased cardiovascular risk factors prevalence also affects the military population.(Gde et al., 2012)

Recent studies reported an increasing trend of coronary artery disease prevalence in the military population (Gde et al., 2012; Lynch & Oelman, 1981). Hypertension, as ASCVD risk factors, is also highly prevalent in military personnel. In the Indonesian Navy Hospital of Dr. Ramelan, secondary hypertension incidence ranked third and primary hypertension in the seventh of the top 10 out-patient clinic visitation, with 13,130 and 6,061 patients respectively.(Oktavia & Martini, 2016) However, the data on ASCVD risk on specific navy military populations are limited.

The initial framework for atherosclerotic cardiovascular disease (ASCVD) risk assessment began with the Framingham Heart Study, the longest-running study of cardiovascular disease in the world.(Wong et al., 2022)Demographic data, such as age and gender, and medical data such as blood pressure, lipid profile, and body mass index, are included in a calculation formula model. The result is a percentage probability of developing atherosclerotic cardiovascular disease (ASCVD) for the next 10

years (D'Agostino et al., 2008). While, European System for Cardiac Operative Risk Evaluation II (EuroSCORE II) is a risk score model that are used toestimate 10-year fatal and non-fatal cardiovascular disease (CVD) risk in individuals without previous CVD or diabetes aged 40–69 years in Europe (Ad et al., 2016). In addition to their role in predicting cardiovascular events, the use of the Framingham and euroSCORE II models may also have utility in predicting the extent and severity of coronary artery disease. Some literature mention that the euroSCORE risk model has a slightly better performance than the Framingham risk model (Günaydın et al., 2016). This study aims to explain descriptively about Atherosclerotic Cardiovascular Disease (ASCVD) risk on Indonesian navy personnel using both of the ASCVD risk calculation.

RESEARCH METHODS

This study design is a descriptive study, using yearly medical check-up data of healthy, Indonesian navy with a high rank (fleet commander) aged 25-60 years old in the period of January-August 2023. A total sampling technique was conducted on the entire population who conducted *medical check-ups* during these periods of study. We assess cardiovascular health metrics such as current smoking, body mass index, blood pressure, and diabetic status and also calculate ASCVD risk. ASCVD risk score determined from Framingham risk score and EUROS II Score calculation.Framingham Score Risk's variables were collected from medical check-up parameter results and then calculated numerically using the formula from its official website *framinghamheartstudy.org*. The results were then categorized into High (Score >20%) Medium (Score >11-20%) and Low Risk (Score <10%) (Anandita, 2023). EuroSCORE II categorized as "red"(10% above risk), "orange" (<10% risk), and "green" (<5% risk) based ontable provided by recent ESC guideline (Śliż et al., 2016). Body mass index (BMI) is stated using the Asian index according to the Indonesian health ministry (Kesehatan., 2019). Lipid profiles are graded according to the lastest ESC guidelines to dislipidemia.(Śliż et al., 2016). Demographic data and the Framingham risk score were calculated in mean average and percentage proportions, and presented in the form of tables and graphs.

RESULTS AND DISCUSSION

A total of 503 samples of medical check-ups were collected during the period of study. Table 1 shows characteristics of demographic variable descriptively, as male is the majority of the Indonesian navy (94,23%). The mean age of these samples study is 45,9 years old and 73,76% are on ASCVD's age risk (>40 years old percentage combined).

Table 1. Demographic data

Demographic Variable	Frequency (n=503)	Percentage (%)
Sex		
Male	474	94,23%
Female	29	5,77%
Age (mean 45,9 years old)		
<30 years old	32	6,36%
30-40 years old	37	7,36%
41-50 years old	189	37,57%
>50 years old	182	36,18%

Table 2 shows the characteristic of all medical variable calculated on the Framingham risk score and euroSCORE II. About 64,81% of navy personnel have a smoking habit, with very few history of hypertension therapy (7,16%) and diabetes (5,8%). Their mean BMI is 26,48 kg/m2 which is categorized as overweight in the Asian index.In concordance with the normal mean of systolic blood pressure and diastolic blood pressure graded using ISH category, only 7.15% of samples are stated as hypertension. Lipid profile according to the latest ESC guideline dominated by hypertrigliseride (≥150 mg/dl) in percentage of 34%, while other increases of traditional lipid markers are 15% or below.

Table 2. ASCVD riskdata

ASCVD Variable	Frequency (n=503)	Percentage (%)
Cardiac-related disease History and Smoking Habit		
Hypertension	36	7,16%
Diabetes	11	2,19%
Smoking	326	64,81%
BMI(mean 26,48 kg/m^2)		
Underweight (<17kg/m^2)	0	0,00%
Normal (17,1-23 kg/m^2**)**	140	27,83%
Overweight (23,1-27 kg/m^2)	224	44,53%
Obese (>27,1 kg/m^2)	139	27,63%
Blood Pressure (ISH Category)(Chakraborty et al., 2021) (systolic mean 118,14 mmHg**;**Diastolic mean 75,51mmHg)		
Normal	467	92,84%
Hypertension gr I	31	6,16%
Hypertension gr II	5	0,99%
Lipid Profile		
Hypercholesterol (≥190mg/dl)	64	12,72%
Hypertrigliseride (≥150 mg/dl)	171	34,00%
High LDL (≥115 mg/dl)	76	15,11%
Low HDL (≤40 mg/dl)	6	1,19%

Table 3. Framingham Risk Score and EuroSCOREII calculation

ASCVD risk Calculation	Male (n=474)		Female (n=29)		Cumulative	
Framingham risk score						
Low risk (<10%)	186	36,98%	28	5,57%	214	42,54%
Medium risk (11-20%)	201	40,16%	1	0,20%	202	40,16%
High risk (>20%)	87	17,10%	0	0,00%	87	17,30%
EuroSCORE II						
Not Graded (Age below 40)	96	19,09%	19	3,78%	115	22,86%
Green (<5% risk)	18	3,58%	1	0,20%	19	3,78%
Orange (<10% risk)	32	6,36%	9	1,79%	41	8,15%
Red (≥10% risk)	328	65,21%	0	0,00%	328	65,21%

Lastly, table 3 show the calculation of both ASCVD risk score differentiate by gender.The Framingham risk score shows 40,16% navy personnel are at medium risk of ASCVD, while smaller percentage (17,3%) are at high risk. Lastly, euroSCORE II show remarkbly 62,21% of ≥10% risk of ASCVD.

DISCUSSION

Military personnel are associated with more physical activity than civilian population. Hence, ASCVD risk still affects the military population. Gde et al. (2012) mention thatlow-rank military personnel has more severe CAD marked by higher Gensini score compared to high-rank personnel (p=0.031). This is due to distress in the low-rank military personnel might increase the risk of atherosclerosis development, causing more severe CAD. High-rank military personnel have also been reported to have less physical exhaustion compared to low-rank since low-rank military personnel tend to work as a standing guard or other physically exhausting jobs daily (Siart et al., 2016).

As a common ASCVD risk factor, males with ages up to 40 years old, will have their *atherosclerotic cardiovascular disease* (ASCVD) risk increase,(Kanchi et al., 2018)but other literature says it could be younger.(O'Neil et al., 2018) In addition, history of cardiovascular disease in family,(Harms et al., 2021) smoking habit,(Kondo et al., 2019) overweight(Powell-Wiley et al., 2021)diabetes,(Almourani et al., 2019) high blood pressure,(Fuchs & Whelton, 2020) and poor lipid profile(Nicholls & Nelson, 2019)may worsen the cardiovascilar risk.(Anandita, 2023)In this study, 73,76% of high-rank navy personnel are on ASCVD's age risk with a large percentage of smoking habit (64,81%) and overweight BMI (44,83%). Due to their less physically active nature, this risk is close to being compared to the common civilian population.

Although most navy personnel have normal lipid profiles, respectively 40,16% and 17,3% of samples show medium and high risk of the Framingham risk calculation, cumulated 57,46% percentage. This mean more than a half of navy personnel may developing atherosclerotic cardiovascular disease (ASCVD) for the next 10 years in 11-20% chance. This is due to the age risk, smoking habit an overweight among navy personnel in Indonesia. However, euroSCORE II show remarkbly higher percentage (62,21%) of high risk ASCVD. The differences between those two ASCVD risk calculation is that Framingham risk score is taking account of diabetes and history of hypertension therapy as high grade marking,(D'Agostino et al., 2008) instead of relying only from lipid profile and smoking as euroSCORE II count.(Śliż et al., 2016)The euroSCORE II risk model has a slightly better performance than the Framingham risk model due to its utility to assess 10-year fatal and non-fatal cardiovascular disease (CVD) risk in individuals without previous CVD or diabetes, despite limited age in range of 40–69 years.(Günaydın et al., 2016)

CONCLUSION

Military personnel are associated with more physical activity than civilian population. Hence, ASCVD risk still affects the military population. More than half (57,46%-62,21%) of navy personnel may developing atherosclerotic cardiovascular disease (ASCVD) for the next 10 years in 11-20% chance due to age risk, smoking habit an overweight. Male population are at risk compared to the female. Those percentage counted from Framingham risk score and euroSCORE II calculation. This finding reveals the need for policy changes to promote, preserve, and improve ideal cardiovascular health in Indonesia Navy Personnel.

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