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The socio-demographics and pattern of atherosclerosis of hospitalized adult patients without SARS-Cov-2 infection in a new tertiary hospital in Malaysia

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Abstract---Background: Atherosclerosis, a chronic inflammatory condition of the arterial intimal wall projected globally to impact healthcare significantly. The pattern of atherosclerosis, namely the atherosclerotic disease and atherosclerotic risk, may or may not be the reason for hospitalization; nevertheless, they have ongoing atherosclerosis that may progress over the years. Studies have shown that both patterns of atherosclerosis play an essential role in conferring poor prognosis and contributing to the leading cause of death. We embark on a study to analyze the socio-demographic and pattern of atherosclerosis of adult patients without SARS-Cov-2 infection admitted to a new tertiary hospital in Malaysia. We exclude patients who are predicted to have a high possibility of death or discharge within 24 hours, lactating mothers, oncology patients and non-Malaysian citizens; Methods: This prospective cross-sectional

study recruited general medical and surgical ward adult patients between 9th October and 1st January 2021. The data were collected using face-to-face interviews with the patients and from the medical records. For our research, we identify the patient's affirmation on having atherosclerosis, atherosclerotic disease, atherosclerotic risks, the reason for admission and their discharge outcome; Results: One hundred and four (80%) out of 130 patients admitted in that time frame were eligible for study analysis. Men constituted 60.6% (n=63), and the total study population ranged from 18 to 85 years. Based on our data, 44 males aged > 45 years and 21 females aged > 55 years old. The majority were Malay (n=85) by ethnicity. Cumulatively, all admitted patients have atherosclerosis, with 12 of them affirmed having the condition during the interview. The study population have either one or the other form of atherosclerotic disease or risk, and it is found that the ratio between the numbers of atherosclerotic risk to the whole population study to be a mean average of 2.9 types of atherosclerotic risks regardless of their modifiability.

Keywords---atherosclerosis, SARS-Cov-2, atherosclerotic disease, atherosclerotic risk.

Introduction

Despite recent technologies and healthcare delivery improvements, deaths due to cardiovascular diseases, stroke, and kidney failures remain high. The increment of prevalence is attributed to the modern society living lifestyles and more proportion of the ageing population in the country. Atherosclerosis is a non-communicable disease widely known as a chronic inflammatory process peculiarly affecting the blood vessel of medium and large size arteries. This, in turn, will trigger off the insufficient blood supplies in human organs due to thickening of the arterial wall as a result of fat layering and inflammation process [1]. The atherosclerotic diseases are acute myocardial infarction, ischemic heart disease, stroke, chronic kidney disease and peripheral vascular insufficiency slowly developed after a constant threat by multifactorial risks of atherosclerosis [2].

The risk for atherosclerosis is other diseases or pathology, with the ability to be reversed, presented far too advanced in the inflammatory process and those on its own, a risk of a permanent entity. For example, age, gender, family history and genetic susceptibility are among the factors established in guidelines as unmodifiable atherosclerotic risk. On the other hand, the modifiable atherosclerotic risk is notably in patients diagnosed with Type II diabetes mellitus, hypertension, hypertriglyceridemia, and obesity [3]. It is also generally believed that good eating habits and exercise have a particular inhibitory effect on the development of atherosclerosis. Both modifiable and non-modifiable atherosclerotic risks are more evident based on being the causal for high mortality and morbidity in atherosclerosis suffering patients. Because of a scarcity of local information in this regard and plenty of reasons for adult admission to a hospital, we took the initiative to analyze the socio-demographic

and pattern of atherosclerosis of adult patients without SARS-Cov-2 infection admitted to a new tertiary hospital in Malaysia.

Materials and Methods

We perform a prospective cross-sectional study on adult patients admitted to general medicine and general surgical wards in a tertiary hospital with a convenient sampling method between the 9th of October and 1th of January 2021. The study received university ethical approval. After giving the study information and obtaining consent, face to face interview was performed, and their blood parameters data were obtained from the medical records. We analyzed our data to determine whether there were statistically significant by using SPSS Ver 26.0 (USA). Chi-Square Test has been used to address the relationship between parametric and non-parametric variables. Descriptive statistics, group comparisons, and correlations were also analyzed. P values < 0.05 were considered statistically significant.

Results

Out of 130 patients admitted to the general medical and surgical ward, 104 patients were analyzed.

Table 1
This showed the reason for admission for all patients (n= 104)

Reason for admission	n (%)
Operation	12 (11.5 %)
Stroke	8 (7.6 %)
Renal Disease	12 (11.5 %)
Liver Disease	6 (5.7 %)
Infection	Total: n= 31 (31.7)
	Abdomen: 14 (13.4 %)
	Prostate: 3 (2.8 %)
	Brain: 10 (9.6 %)
	Nose: 2 (1.9 %)
	Urine: 2 (1.9 %)
	Bone Broken 35 (33.6 %)

Majority at 60.6 % (n=63) were male with elderly group at 52.9 % (n=55) of the population studied while 26.9 % (n=28) and 20.2 % (n=21) were middle age and young adults respectively. Men constituted 60.6% (n=63) of the study population aged 18 to 85 years. Our data shows 43 men aged > 45 years and 20 females old > 55 years. The majority were Malay (n=85) by ethnicity. Cumulatively, 12 of the other forms of atherosclerotic disease was found in the study population, and each patient had an average of 5 atherosclerotic risks regardless of their modifiability table 2.

Table 2

This shows the demographic analysis for patients admitted to HPUPM

Variables	Frequency (n)	Percentage (%)
Gender		
Male	63	60.6
Female	41	39.4
Age group (years)		
Young-Adult (19-39)	21	20.2
Middle-Age (40-69)	28	26.9
Old (60-89)	55	52.9
Hospitalization Payment		
Self	47	43.5
Government	57	52.8
Ethnicity		
Malay	85	81.7
Indian	7	6.7
Chinese	12	11.5
Do you have Atherosclerosis?		
Yes	12	11.5
No	92	88.5

Disease and risk factors

Table 3 showed a significant association between BMI and atherosclerosis ($p=0.0475$) ($n=104$).

Table 3

The relationship between BMI classification and atherosclerosis

BMI Classification	Atherosclerosis			P-value
	Yes n (%)	No n (%)	Total n (%)	
Underweight	0 (0.0%)	4 (3.8%)	4 (3.8%)	0.0475
Normal	4 (3.8%)	29 (27.9%)	33 (31.7%)	
Overweight	5 (4.8%)	39 (37.5%)	44 (42.3%)	
Obese I	1 (1.0%)	17 (16.3%)	18 (17.3%)	
Obese II	1 (1.0%)	2 (1.9%)	3 (2.9%)	
Obese III	1 (1.0%)	1 (1.0%)	2 (1.9%)	

In contrast, there was no relationship between Mid-Upper Arm Circumference (MUAC) and atherosclerosis ($p=0.0622$) ($n=104$), as shown in table 4.

Table 4
The Relationship between MUAC and Atherosclerosis

MUAC	Atherosclerosis			P- Value
	Yes n (%)	No n (%)	Total n (%)	
Healthy	12 (11.5%)	86 (82.7%)	98 (94.2%)	0.0622
Moderate	0 (0.00%)	6 (5.8%)	6 (5.8%)	

A Chi-square test was done to determine the atherosclerosis risk factors and prevalence of atherosclerosis disease. It was found in our study that high cholesterol, alcohol and stress are causative factors of atherosclerosis as there was a significant association between high cholesterol (n=24), alcohol (n=13) and stress (n=54) with atherosclerosis (p= <0.05) table 5.

Table 5
Association between cholesterol, stress and alcohol with atherosclerosis

Cholesterol	Atherosclerosis			P- Value
	Yes n (%)	No n (%)	Total n (%)	
Yes	8 (33.3%)	16 (66.7%)	24 (100%)	0.001
No	4 (5.0%)	76 (95.0%)	80 (100%)	

Alcohol	Atherosclerosis			P- Value
	Yes n (%)	No n (%)	Total n (%)	
Yes	5 (4.8%)	8 (7.7%)	13 (12.5%)	0.001
No	7 (6.7%)	84 (80.8%)	91 (87.5%)	

Stress	Atherosclerosis			P- Value
	Yes n (%)	No n (%)	TOTAL n (%)	
Yes	12 (11.5%)	42 (40.4%)	54 (51.9%)	0.001
No	0 (0.0%)	50 (48.1%)	50 (48.1%)	

We also demonstrated the presence of a significant correlation between family history and atherosclerosis (p=0.047) (n=39) table 6

Table 6
The Relationship between MUAC and Atherosclerosis

Family History	Atherosclerosis			P- Value
	Yes n (%)	No n (%)	Total n (%)	
YES	9 (8.7%)	30 (28.8%)	39 (37.5%)	0.0478
NO	3 (2.9%)	62 (59.6%)	65 (62.5%)	

However, cases of hypertension were not significantly correlated with atherosclerosis (p= 0.0812) (n=28) table 7.

Table 7
The Relationship between MUAC and Atherosclerosis

Hypertension	Atherosclerosis		Total n (%)	P- Value
	Yes n (%)	No n (%)		
YES	11(10.6%)	48 (46.2%)	59 (56.7%)	0.0812
NO	1 (1.0%)	44 (42.3%)	45 (43.3%)	

According to our analysis, there was no significant association between diabetes with atherosclerosis ($p= 0.653$), insulin resistance ($p= 0.647$) and sleep apnoea ($p= 0.712$) table 8.

Table 8
Association between Cholesterol, Stress and Alcohol with Atherosclerosis

Diabetes	Atherosclerosis		Total n (%)	P- Value
	Yes n (%)	No n (%)		
Yes	3 (2.9%)	23 (22.1%)	26 (25.0%)	0.653
No	9 (8.7%)	69 (66.3%)	78 (75.0%)	

Insulin resistance	Atherosclerosis		Total n (%)	P- Value
	Yes n (%)	No n (%)		
Yes	5(4.8%)	17 (16.3%)	22 (21.2%)	0.647
No	7 (6.7%)	75 (72.1%)	82 (87.8%)	

Sleep apnea	Atherosclerosis		Total n (%)	P- Value
	Yes n (%)	No n (%)		
Yes	1 (1.0%)	11 (10.6%)	12 (11.5%)	0.712
No	1(10.6%)	81 (77.9%)	92 (88.5%)	

Discussion

It is evident from this study that there is a positive relationship between nutritional status and atherosclerosis awareness in hospitalized patients of general medical and surgical wards. The prevalence of this environmentally persistent disease imposes a significant burden on society. Many of the underlying causes and risk factors begin in youth. Thus, the challenge is to promote healthy nutrition and physically active lifestyles as early as possible in young adults throughout the world. Atherosclerosis (AR) is one of the key contributing factors for the progression of cardiovascular disease (CVD). Therefore, various pharmacological techniques were used to decrease or prevent

atherosclerosis growth. Of note, many studies over recent years have highlighted the function of multiple nutrients and bio-active compounds in the mechanisms of plaque-forming processes. The rise in the progression of atherosclerosis is correlated with nutrients such as saturated fatty acids and trans-fatty acids, among others. Therefore, there is also a need to develop sufficient nutritional guidelines to minimize the incidence of atherosclerosis (AR) in nutrition. New clinical randomized trials of a mixture of specific diets, nutrients and bio-active compounds that synergistically enhance capillaries and blood vessel physiological conditions are necessary to reduce the risk of atherosclerosis. Research is ongoing, however, and new evidence could lead to better future treatment.

BMI and MUAC interpretations

BMI mean levels of the current study was showed a significant association between (BMI) and atherosclerosis test ($p=0.0475$) in patients admitted to HPUPM ($n=104$). BMI in contrast, most of the angiography-based cross-sectional studies, including the present, have found no material relationship between obesity and coronary atherosclerosis [4]. In an older analysis study (35 to 54 years old), the risk link between obesity and atherosclerosis has been seen, indicating that these risk factors may be continuously present as atherosclerosis progresses [5]. MUAC mean levels of the current study showed that there was no relationship between MUAC and atherosclerosis test ($p=0.0622$) in patients admitted to HPUPM ($n=104$), and no investigation was done before about the relationship between AR and MUAC.

Cholesterol, stress and alcohol with atherosclerosis

Population studies have demonstrated that elevated cholesterol levels are directly associated with risk for atherosclerotic [6]. However, in this study, there was an exact significant association between high cholesterol ($n=24$), alcohol ($n=13$) and stress ($n=54$) with atherosclerosis ($p<0.05$). Atherosclerosis is a slow pathological process that begins in early life, and part of this process can be prevented by lifestyle modification. As such, detection of the early stages of atherosclerosis could be life- and cost-saving; stress is a significant feature in the development of atherosclerosis [7]. However, there was an exact significant association between stress ($p=0.0001$) with atherosclerosis and alcohol ($p=0.0001$).

Family history and atherosclerosis

In most cases of premature-onset CHD such as Atherosclerosis, a positive family history of CHD is present. The mode of genetic transfer in families is less apparent in the majority of cases of premature-onset CHD. For decades, a family history of coronary artery disease has been thought to be a contributing factor. In this context, Nasir et al. in this Circulation issue of provide a fascinating and timely contribution to the family history literature. The authors examined the association of a reported family history of early-onset (before age 55 years) CHD such as Atherosclerosis [8]. Also, the study reflected a significant correlation between family history and Atherosclerosis ($p=0.047$).

Finally, Improved treatments have reduced the number of deaths from atherosclerosis-related diseases. These treatments also have improved the quality of life for people who have these diseases. However, atherosclerosis remains a common health problem. You may be able to prevent or delay atherosclerosis and the conditions it can cause. Making lifestyle changes and getting ongoing care can help you avoid the problems of atherosclerosis and live a long, healthy life [9]. Atherosclerotic disease is a prevalent pathological condition widely recognized as a cardiovascular threat element by multiple factorial danger elements. Atherosclerosis was involved in several bacterial and viral pathogens. Nutrition and health in our life are often neglected—most nutritional diets are not interventions to prevent several diseases. However, dietary interventions could play a part in preventing most diseases such as atherosclerosis. Timely intervention can stop some risk factors of Atherosclerosis. The nutritional status is associated with various metabolic diseases, i.e., under or overweight, which usually contribute to immune cell comptonization [10].

The clinical practice guidelines on managing Atherosclerosis risk (AR) and disease (AD) have been developed to provide proper health care. However, there is a lack in addressing the matter of their actual nutritional state and whether it is related to their immune system. These primary health issues have been traditionally managed by each health care system available that it has become an issue of metabolism of one's general well-being. Some standard features globally are correlated with different macronutrient profiles in balanced dietary patterns. The role of food-based bioactive compounds in reducing the risks of atherosclerosis has been intensely evaluated [11].

This is the first study that has been done in Hospital Pengajar UPM (HPUPM) and has used a small sample size due to unavoidable circumstances. In October 2020, the HPUPM policy decided to close a few laboratories and warred services due to decontaminations of those areas that had infection invasion in addition to the sudden surge of Covid-19 positive cases across the country. Due to time limitations, dietary intake has not been included in this study. Even though we have a small number of patients, it is undeniable that there is a significant warrant for continuous surveillance of the non-modifiable risk factors optimal management. We learned that good data management in our new center, and good record filing for traceability is crucial.

Conclusions

To the best of our knowledge, this is the first report on hospitalized patients' patterns of atherosclerotic disease and risk in Malaysia. Based on our study, hospitalized patients have at least 2.9 types of atherosclerotic risk with documented mortality outcome of 0.9% at the end of the study. Hence, it is essential to conclude that admitted patients in any new tertiary hospital already have multiple atherosclerotic risks that must be addressed during hospitalization.

Author contributions

All authors have read and agreed to the published version of the manuscript.”

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Institutional review board statement

“The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board (or Ethics Committee) of University Putra Malaysia (JKEUPM) (JKEUPM-2020-273 in 09/10/2020).”

Informed consent statement

“Not applicable.”

Data availability statement

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Appendix A

List of Abbreviations

CVD	Cardiovascular Diseases
AS	Atherosclerosis
ASR	Atherosclerosis Risk
ASD	Atherosclerotic Disease
HDL	High Density Lipoprotien
LDL	Low Density Lipoprotien
BMI	Body Mass Index
MUAC	Mid-Upper Arm Circumference
HPUPM	Hospital Pengajar University Putra Malaysia
JKEUPM	Jawatankuasa Etika Universiti Putra Malaysia

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