



UNIVERSITI PUTRA MALAYSIA

***ASSOCIATION BETWEEN ATHEROSCLEROSIS RISK FACTORS,
ANTHROPOMETRIC STATUS AND THE SOCIODEMOGRAPHIC
FACTORS WITH ATHEROSCLEROSIS AWARENESS AMONG NON-
COVID19 PATIENTS ADMITTED IN A TEACHING HOSPITAL, MALAYSIA***

MOHAMAD AHMAD ALATI

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By

MOHAMAD AHMAD ALATI

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,
in Fulfilment of the Requirements for the Degree of Master of Science**

October 2021

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

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October 2021

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Atherosclerosis (AS), a chronic inflammatory disease, is the main cause of cardiovascular disease that entails two conditions, namely the AS risk (ASR) and disease (ASD). ASDs remained the principal cause of death worldwide yet the state of awareness of AS in hospitalised patients are not well reported. There are nutritional strategies in promoting health by understanding the detrimental effects of AS clinically but AS awareness in any individual is an essential state of mind for the healthcare provider to extend the ideal prevention or treatment program with measurable outcomes. To determine the association of atherosclerotic risk (ASR), anthropometric status and sociodemographic factors with AS awareness among non-COVID-19 patients admitted in HPUPM. This is a cross-sectional prospective study and data was obtained from respondents admitted to general medical and surgical wards in HPUPM through interviews as well as electronic medical records from October 9th, 2020 through January 1st, 2021. More than 60% were males (n=63) with more than half were ages more than 60 years old and the admission was predominantly for surgical intervention. Our research showed the prevalence of AS awareness in adult non-COVID-19 patients admitted to HPUPM was as low as 11.5% from 104 total research subjects with significant association with high cholesterol, alcohol, stress and family history but none with diabetes, insulin resistance, OSA and hypertension as per ASRs. Significant association of AS awareness are seen with BMI (p=0.0475) but not to MUAC (p=0.0622). The full blood count parameters findings were heterogenous but MCHC and RDW were within normal range in all subjects. Our research showed a worrisome low AS awareness in non-COVID19 hospitalised patients and association with BMI and certain other ASRs. Majority of the research subjects has AS and with low AS awareness therefore AS awareness is a form of ASR on its own. We recommend an AS awareness interventional program and outcome research in the future with longer follow up.

Keywords: atherosclerosis awareness, risk, disease, anthropometric status measurements, HPUPM.



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

PERSATUAN ANTARA FAKTOR RISIKO ATEROSLEROSIS, STATUS ANTROPOMETRI DAN FAKTOR SOSIODEMOGRAFI DENGAN KESEDARAN ATEROSLEROSIS DALAM KALANGAN PESAKIT BUKAN COVID19 YANG DIMASUKKAN DI HOSPITAL PENGAJARAN, MALAYSIA

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Aterosklerosis (AS), penyakit radang kronik yang merupakan punca utama penyakit kardiovaskular adalah terdiri dari dua keadaan gejala iaitu risiko (ASR) dan penyakit (ASD). ASD adalah punca utama kematian secara global tetapi tiada laporan terhadap kesedaran pesakit terhadap AS dimasukkan ke hospital. Telah ada beberapa strategi nutrisi yang mempromosikan kesihatan yang baik dengan menambahkan kefahaman efek buruk AS secara klinikal namun kesedaran mengenai AS seseorang individu adalah keadaan pemikiran yang mustahak untuk pemberian jagaan kesihatan lalu memanjangkan cara pencegahan yang sesuai atau program rawatan yang hasilnya boleh diukur. Untuk menentukan perkaitan risiko aterosklerotik (ASR), status antropometrik dan faktor sosiodemografi dengan kesedaran AS dalam kalangan pesakit bukan COVID-19 yang dimasukkan ke HPUPM. Ini adalah kajian prospektif keratan rentas. Data diperolehi daripada responden yang dimasukkan ke wad perubatan dan pembedahan am di HPUPM melalui temubual serta rekod perubatan elektronik bermula pada 9hb Oktober 2020 hingga 1hb Januari 2021. Lebih 60% dari golongan pesakit adalah lelaki (n=63), lebih separuh berumur 60 tahun keatas dan kemasukan wad kebanyakannya adalah untuk intervensi pembedahan. Kajian kami menunjukkan kadae kesedaran AS dalam pesakit tanpa COVID-19 di HPUPM adalah sekecil 11.5% dari 104 responden dan berkait secara signifikan dengan kolesterol tinggi, arak, tekanan dan sejarah keluarga tetapi tiada kaitan dengan kencing manis, rintangan insulin, penghentian pernafasan semasa tidur dan darah tinggi dari segi ASR. Terdapat kaitan signifikan antara BMI ($p= 0.0475$) dengan kesedaran AS tetapi tiada kepada MUAC ($p=0.0622$). Parameter penuh darah menunjukkan kepelbagaian namun MCHC dan RDW didapati normal kepada semua pesakit yang dikaji. Kajian kaimi menunjukkan kekurangan kadar kesedaran AS yang membimbangkan dikalangan pesakit hospital tanpa Covid19 dan berkaitan dengan BMI dan beberapa jenis ASR yang lain. Kebanyakan pesakit

mengalami AS dan kurang kesadaran AS didalam kajian kami, oleh itu ia kekurangkesedaran AS adalah dengan sendirinya merupakan sejenis ASR. Kami mengesyorkan program intervensi kesadaran AS dan penyelidikan hasil dari program tersebut dibuat pada masa hadapan dengan susulan yang lebih lama.

Kata kunci: kesadaran aterosklerosis, risiko, penyakit, ukuran status antropometrik, HPUPM.



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This thesis was submitted to the Senate of the Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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LIST OF ABBREVIATIONS

AS	Atherosclerosis
ASR	Atherosclerotic Risk
ASD	Atherosclerotic Disease
STEMI	ST-segment elevation myocardial infarction
ASCVD	Atherosclerotic Cardiovascular Disease
CVD	Cardiovascular Disease
CKD	<i>Chronic Kidney Disease</i>
PVD	Peripheral Vascular Disease
hDL	High Density Lipoprotien
LDL	Low Density Lipoprotien
VSMCs	Vascular smooth muscle cells
BMI	Body mass Index
HPUPM	Hospital Pengajar Universiti Malaysia
SMC	Smooth Muscle Cell
HF	Heart Failure
CAD	Coronary Artery Disease
MI	Myocardial Infarction
CV	Various Cardiovascular
BP	Blood Pressure
ECM	Extracellular Matrix
CRP	C-reactive Protein
TSF	Triceps Skin Fold thickness
MUAC	Mid-Upper Arm Circumference

HIV	Human Immunodeficiency Virus
AIDs	Acquired Immunodeficiency Syndrome
OTP	Opioid Treatment Program
SPSS	Statistical Package for Social Sciences
JKEUPM	Jawatankuasa Etika Universiti Putra Malaysia



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CHAPTER 1

INTRODUCTION

1.1 Background

Atherosclerosis (AS) is a progressive chronic inflammation resulting from lipid metabolism imbalances and a disordered immune reaction induced by the aggregation of macrophages carrying cholesterol in walls of the artery (Moore et al., 2013). AS symptoms depends on where the affected artery is located and whether it has gradually become narrowed or blocked. Chest pain, coughing, angina, difficulty in breathing, swelling of the hands and feet, erectile dysfunction etc. are among the symptoms of AS (Chaikriangkrai et al., 2014). Every so often the first symptom of AS is a heart attack or stroke (Weisfeldt & Ziemann, 2007). Clinical manifestations of AS occurs in two out of every three men and in women above the age of 40 (Faxon et al., 2004). AS is prevalent in developed countries and men are at a higher risk which also and it increases with age. The risk of AS tends to run in families having either a family member with a history of angina or a heart attack under the age of 50.

(Alpert, 2011). However, many of the risk factors for AS can be controlled and are manageable. It is known that fatty diets especially saturated and trans fats are more likely to cause AS as well as uncontrolled high blood pressure (diastolic or systolic) can cause AS leading to heart attack and stroke (Uddin et al., 2016). Sedentary lifestyle, excessive alcohol consumption, ingesting inadequate amounts of fruits and vegetables, as well as diet consisting of with high levels of cholesterol content can increase the risk of AS (M. M. Kanter et al., 2012). Obesity is considered an epidemic in our society that contributes too many of the medical complications such as high blood pressure and cholesterol levels as well as atherosclerosis (McGill Jr et al., 2002). Despite pre-existing pharmacotherapies, today, thirty percent of worldwide deaths are due to cardiovascular diseases (CVD), where AS is the leading cause, an inflammatory disorder characterized by the build-up of lipid deposits inside arteries. Multiple cellular signalling pathways are involved in the underlying process of AS. Several classes of nutraceuticals have potential benefits for the prevention and treatment of AS and CVD (Aquila et al., 2019).

However, the risks of AS treatments are essential, sample of evidence show that AS occurs directly through the effects of vascular cell infection and indirectly through the disease of cytokine as well as acute reacting proteins (Rosenfeld & Campbell, 2011). Although, most nutritional diets are not interventions to prevent several diseases, but, dietary interventions play a huge role in preventing most diseases including AS. The anthropometric status is associated with various metabolic diseases (Becker et al., 2014).

1.2 Problem Statement

AS awareness and recognizing its symptoms are crucial during screening for early detection. If the public is well informed about the disease and its symptoms, prevent it from happening to them or go to healthcare providers for check-ups are in much better position compared to those who not aware of AS and the healthcare options. The insight which may be a direct or indirectly developed in population with ASR or ASD have a different quantum effect. Right from keeping them in denial from taking preventative action to frequent visits to their doctor and accessing care. It is well known that nutrients can affect the occurrence and development of this AS but much to common understanding, it is not a part of doctor's prescription who kept advising for the universal of healthy lifestyle and healthy eating. At present, in nutritional science, emerging research on AS have revealed the nutrients do play an essential role in AS prevention strategy and the possible mechanisms of its action (Wei et al., 2021).

AS besides an ageing disease, is an exceedingly dangerous vessel condition, leading to acute heart syndromes, strokes, peripheral vascular insufficiency, and a lot more critical organ blood loss due to insufficient blood supplies in human organs. Coronary heart disease (CHD) or also known as coronary artery disease (CAD) or atherosclerotic cardiovascular disease (ACVD) or cardiovascular disease (CVD) or cardiovascular atherosclerotic disease (CVAD) or ischaemic heart disease (IHD) are all the same ASD affecting the vessels of the heart and related to various environmental and lifestyle factors, including an unhealthy dietary pattern, physical inactivity, as well as smoking. Dietary modification has been involved in managing and reducing the risk of CHD (Alissa & Alama, 2015). The first strategy of treatment is to make alterations to lifestyle habits and emphasize on beneficial properties of certain nutrients (Torres et al., 2015). They concluded that elderly was the primary group affected by AS, and elderly patients without ASR developed AS due to ageing process. The unhealthy nutritional status that was relevant AS were found to be obesity, high cholesterol, and stress.

A simple illustration would be of those individuals who clearly suffers from comorbidities or had a previous cardiovascular ASD event, a state of being aware of the ravages of high cholesterol levels should be the main goal of cholesterol control that evidently reverse or prevent any chances of cardiovascular mortality and morbidity in a given future. In another perspective, patients equipped with AS awareness of cholesterol in primary or secondary prevention setting, it does contribute effectively to the prevention of cardiovascular disease. Therefore, the scope of this study was to determine the relationship between AS awareness to atherosclerotic risk factors (ASRs), anthropometric status and their sociodemographic factors in patients admitted in a general ward at Hospital Pengajar University Putra Malaysia (HPUPM).

1.3 Research Questions

1. What are the sociodemographic factors among patients with AS awareness in HPUPM?
2. What is the prevalence of ASR among patients with AS awareness in HPUPM?
3. What is the anthropometric status among patients with AS awareness patients in HPUPM?
4. Is there any association between anthropometric status and AS awareness?
5. What is the mean level of full blood count parameters in patients with AS awareness?

1.4 Research Objectives

1.4.1 General Objectives

To determine the factors associated with AS awareness among the non-COVID-19 patients admitted to general ward of HPUPM in 2021.

1.4.2 Specific Objectives

- I. To determine the sociodemographic factors (age, sex, ethnicity, marital status, occupation, educational level) among the non-Covid-19 patients with AS awareness admitted in HPUPM.
- II. To determine the ASR (hypertension, obesity, cholesterol, family history, stress, smoking, DM, alcohol intake, obstructive sleep apnoea, insulin resistance) among the non-Covid-19 patients with AS awareness in HPUPM.
- III. To determine the anthropometric status factors (BMI and Mid Upper-Arm Circumference) among the non-Covid19 patients with AS awareness in HPUPM.
- IV. the prevalence of ASD among the non-Covid-19 patients in HPUPM.
- V. To determine the association between anthropometric status and AS awareness.
- VI. To determine the mean average of full blood count parameters in patients with AS awareness.

1.5 Research Hypothesis

1.5.1 Hypothesis

There is an association between AS risk factors, anthropometric status, and the sociodemographic factors with AS awareness among non-covid19 patients admitted in HPUPM, 2021.

1.5.2 Null Hypothesis

There is no association between AS risk factors, anthropometric status, and the sociodemographic factors with AS awareness among non-covid19 patients admitted in HPUPM, 2021.

1.6 Research Significance

Worldwide population health status is affected by AS. These primary health issues have been traditionally addressed by each health care system available. The clinical practice guidelines on managing ASR and ASD have been already in place for many years but the main cause of death still remains the same throughout the decades. HPUPM hospital has been operational since 2018 and similar to global incidence, it is presumed that ASD is the most common admission parallel to the main cause of death in Malaysia according to the national statistics. The nations' objectives to reduce CVD death has expanded to identifying and correction of the modifiable ASR and keep the non-modifiable ASR in check, nevertheless, there is a halt in reports whether Malaysian patients with ongoing AS are aware of these measures to counter the AS progression and that this non-communicable disease which also indirectly benefit other disease such as cancers, malnutrition, psychiatric diseases, among others. Similarly, they are worldwide health problems. The popularity of COVID19 effects to individuals with comorbidities and chronic illness has been popularized through the mass media, but we do not have any data particularly in Malaysia whether at baseline, do Malaysian population are well aware of AS. Reports on AS awareness strongly related to nutritional status and anthropometric status of an individual are almost unheard of.

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