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Screening of Lipid Panel in Adults and Evaluation for the Risk Factors of Atherosclerosis Cardiovascular Disease.

A research submitted to the Department of Clinical Pharmacy, Faculty of medicine and Health Sciences, Emirates International University as A partial Fulfillment for pharm-D Graduation

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Dedication

We dedicate this project to our parents, our strong pillars, and our source of inspiration and wisdom . They have been the source of our strength throughout this program and on their wings only have we soared.

To our distinguished professors and doctors, you have given us a lot, and you were keen to provide clear knowledge to us, so thank you for your generous efforts.

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Abstract

Background: Atherosclerotic cardiovascular disease (ASCVD) is a major global health issue primarily linked to dyslipidemia, particularly high levels of low-density lipoprotein cholesterol (LDL-C). Despite the risks associated with elevated LDL-C, many individuals remain undiagnosed due to the asymptomatic nature of dyslipidemia. Effective screening and treatment can reduce ASCVD risk by up to 50%, but adherence to guidelines is often lacking, especially in vulnerable populations.

Aim: The study aimed to evaluate the effectiveness of primary and secondary preventive medicine in lowering the risk of ASCVD.

Methodology: A cross-sectional study was conducted at Nour El Din Al-Jaber Cardiology Center in Sana'a, Yemen, from January to June 2024. A total of 100 cardiovascular disease patients were assessed for socio-demographic factors, ASCVD risk factors, and treatment adherence through structured questionnaires.

Result: Among participants, 68% were male, with significant rates of hypertension (22%) and dyslipidemia (20%). Most patients (69%) required pharmacological intervention, and many adhered to American Heart Association (AHA) guidelines for statin use. Key findings indicated that age, gender, and diagnosis significantly influenced ASCVD risk, while factors like smoking had little impact.

Conclusion: The study underscores the urgent need for targeted public health interventions, enhanced screening programs, and personalized treatment plans to effectively manage ASCVD in Yemen. Addressing modifiable risk factors through community-based initiatives is critical for improving adherence to established guidelines.

Keywords: Statin, Cardiovascular, Risk factor

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List of abbreviation

ACC	American College of Cardiology
ACEI	Angiotensin Converting Enzyme Inhibitor
ACS	Acute coronary syndrome
AHA	American Heart Association
AHTN	Anti-Hypertension
ApoB	Apolipoprotein B
ARB	Angiotensin Receptor Blocker
ARNI	Angiotensin Receptor/ Neprilysin Inhibitor
ASCVD	Atherosclerotic cardiovascular disease
BB	Beta Blocker
B-NR	Benefit > Risk Non-randomized
B-R	Benefit > Risk
CAD	Coronary Artery Disease
CCB	Calcium Channel Blocker
CKD	Chronic Kidney Disease
C-LD	Limited Data

COR	Class of Recommendation
CVD	Cardiovascular disease
ECG	Electrocardiograms
ESC	European Society of Cardiology
FH	Familial hypercholesterolemia
HDL-C	High Density Lipoprotein Cholesterol
HF	Heart Failure
IDL	Intermediate Density Lipoprotein
IHD	Ischemic Heart Disease
LDL	Low Density Lipoprotein
LDL-C	Low Density Lipoprotein Cholesterol
LOE	Level of Evidence
Lp(a)	Lipoprotein(a)
T2DM	Type II Diabetes Mellitus
TC	Total Cholesterol
TG	Triglycerides
VLDL	Very Low Density Lipoprotein

Chapter One: Introduction

1. Introduction

1.1 Background:

Atherosclerotic cardiovascular disease (ASCVD) remains one of the leading causes of morbidity and mortality worldwide, with elevated serum cholesterol levels recognized as a significant risk factor. The relationship between lipid profiles and cardiovascular health has prompted the widespread use of lipid panels in clinical practice. Physicians evaluate various factors—including lifestyle, cardio-metabolic conditions, and diagnostic tests such as electrocardiograms (ECGs) and chest X-rays—to form a comprehensive understanding of a patient's cardiovascular risk. International guidelines further inform the therapeutic approaches employed to manage these risks [1].

One substantial risk factor for the world's first two leading causes of morbidity and mortality, coronary artery disease (CAD), and stroke, is dyslipidemia, or abnormal blood lipid levels. Long-term epidemiologic studies have repeatedly shown that good lipid profiles and a healthy lifestyle should associate with less CHD. Dyslipidemia is one of the most important targets for prevention in atherosclerotic cardiovascular disease (ASCVD), and have known to reduce CVD morbidity or mortality up to 30–40%.[2]

Dyslipidemia signs: Increased Triglycerides, Decreased HDL-C and/or Elevated LDL-C. These lipid abnormalities affect differently the pathophysiology of atherosclerosis: a disease characterized by plaque accumulation into artery walls leading, among other events to decrease blood flow and increase cardiovascular related morbidity as myocardial infarction and stroke.[1]

Atherosclerotic Cardiovascular Disease (ASCVD): dyslipidemia is the primary modifiable risk factor for ASCVD, which causes more deaths than any other disease worldwide. Elevated LDL-Cs are of particular concern because they have a direct relationship with the development and progression of atherosclerosis. Dyslipidemia is often asymptomatic — indeed the majority of patients with this disorder remain untreated, whilst the implications for cardiovascular outcomes are considerable [2]. ASCVD can be prevented by early detection and intervention particularly in subjects with high levels of LDL-C. An individual's LDL-C level should be measured as part of a global cardiovascular risk assessment in all individuals has been central to the

prevention and treatment of ASCVD. In youngsters, adolescents and children an increased risk of ASCVD with high cholesterol is reduced when selective lipid profile screening is used. This is even more important if other circumstances apply, like the presence of a number of concurrent cardiovascular risk factors or an (early-onset) family history for ASCVD. Family members can also benefit from cascade screening when a patient is diagnosed with familial hypercholesterolemia (FH) [4].

Statin drugs, known for their lipid-lowering properties, have become a cornerstone in the prevention of ASCVD. By effectively reducing low-density lipoprotein (LDL) cholesterol levels, statins not only improve lipid profiles but also play a crucial role in stabilizing atherosclerotic plaques and reducing the incidence of cardiovascular events. This paper aims to explore the mechanisms by which statins lower cholesterol, their efficacy in preventing ASCVD, and the implications of their use in clinical practice. Through a review of current literature, we will examine both the benefits and potential risks associated with statin therapy, ultimately highlighting their significance in contemporary cardiovascular care.[5]

1.2 Problem statement:

Over the past few decades, atherosclerotic cardiovascular disease (ASCVD) has remained one of the most significant health challenges worldwide due to elevated low-density lipoprotein cholesterol ([LDL-C], often termed “bad” cholesterol). Even though people know how high bad cholesterol has taken down a lot of our loved ones through ASCVD, so many millions remain undiagnosed and untreated for this because there are no signs or symptoms ascribable to high LDL-C. Based on today's guidelines, timely screening and treatment can cut the risk of ASCVD by as much as 50 percent. Nevertheless, as we know with science and principles, there is a distance between these regulations, evidently.[6] This gap exists in a number of populations, such as young people and individuals with genetic disorders like familial hypercholesterolemia (FH). Statins are important, disease-modifying drugs to lower cholesterol levels and decrease the risk of cardiovascular events. However, statin use remains spotty in this population because of differing views on risk factors, treatment guidelines and patient characteristics. This article intends to:

- Estimates how well does early screening work: Are current practices adequate for identifying people who are at higher risk of future drug problems-- including children and adolescents?
- Evaluate guideline adherence: To what extent are lipid management guidelines being followed in the real world?
- Evaluate statin Therapy: Are statins being appropriately utilized for both ASCVD prevention and treatment, using the correct dosing strategies as well as monitoring practices [7].

These are the areas that this study investigated to help us better identify and manage individuals at risk of ASCVD, in order to reduce its burden as we move forward.[6]

1.3 Objectives:

- **General Objective:** To determine how effective primary and secondary preventive medicine applications are in lowering the risk of ASCVD.[6]
- **Specific Objective:** To evaluate the impact of lipid management on preventing fatal and non-fatal cardiovascular events and evaluating the effectiveness of statin therapy based on international guidelines and results of existing literature.[5]

Chapter Two: Literature Review

2. Literature review

2.1 Several Clinical Trials

The efficacy and cardiovascular benefit of statin therapy have been clearly demonstrated in landmark clinical trials that validated their ability to reduce low-density lipoprotein cholesterol (LDL-C) levels. The best known analyses were those like the Cholesterol Treatment Trialists (CTT) Collaborators meta-analysis, where data from many tens of thousands or more patients in these massive studies can be compiled and assessed for what has it meant to cardiovascular outcomes stemming from statin treatment. [8]

2.1.1 Data on the Scandinavian Simvastatin Survival Study (4S), one of the earliest to demonstrate a substantial drop in cardiovascular mortality with statin therapy. The 4S study included 4,444 people enrolled and showed that simvastatin effective in lowering LDL-C levels, greatly that the occurrence of cardiovascular events and death among patients with coronary heart disease were significantly lowered. The study concluded that secondary prevention with simvastatin in a high risk group with CHD reduced overall mortality by 30%. Non-fatal CHD events and fatal and non-fatal cerebrovascular events were reduced without an increase in risk of cancer. [11].

2.1.2 Atorvastatin ASCOT-LLA trial were also important. The study was conducted in 2005 by Peter S Sever, that included 10,305 hypertensive patients with no history of coronary heart disease (CHD) but at least three cardiovascular risk factors were randomly assigned to receive 10 mg atorvastatin or placebo. Effects on total cardiovascular outcomes in 2,532 patients who had type 2 diabetes at randomization were compared. the trial demonstrated significant reductions of vascular end-points using a higher baseline participant profile treated with atorvastatin for those hypertensive diabetics [14].

- 2.1.3 Several other pivotal clinical trials were reviewed in the CTT meta-analysis in 2002; most importantly HPS (Heart Protection Study), with a sample of 20 536 UK adults (aged 40–80 years) with coronary disease, other occlusive arterial disease, or diabetes were randomly allocated to receive 40 mg simvastatin daily (average compliance: 85%) or matching placebo (average non-study statin use: 17%). Analyses are of the first occurrence of particular events, and compare all simvastatin-allocated versus all placebo-allocated participants. Results demonstrated incremental benefits of statin therapy across a wide spectrum of high risk populations that significantly included diabetics as well as frequently hypertensive and those with peripheral vascular disease [12].
- 2.1.4 The Prospective Study of Pravastatin in the Elderly at Risk (PROSPER) conducted in 2002 by Kulbertus H, Scheen AJ that involved 2804 men and 3000 women aged 70 to 82 with a history of, or risk factors for cardiovascular disease. Their baseline cholesterol level was 135-350 mg/dl; they were randomized to either 40 mg pravastatin per day, or matching placebo. Average follow-up was 3.2 years[27]. The primary endpoint was a composite of coronary death, non-fatal myocardial infarction, and fatal or non-fatal stroke. Pravastatin lowered LDL-cholesterol (-34%), and reduced the incidence of the primary endpoint. Coronary death and non-fatal myocardial infarction risk was also reduced, and mortality from coronary disease fell by 24% ($p = 0.043$). The risk for stroke, however, was unaffected, whereas the incidence of transient ischemic attacks was reduced by 25%, which was (marginally) insignificant and showed that pravastatin could decrease LDL-C levels in the elderly, and reduce major cardiovascular events among at-risk individuals [13].
- 2.1.5 The meta-analysis by CTT, including >170,000 patient records of major vascular events and statin therapy from multiple trials, concluded that there is a consistent reduction in low-density lipoprotein cholesterol (LDL-C) concentrations achieved with statins associated with the degree of event risk so

much their absolute clinical impact on these risks would be substantial. In particular, the analysis revealed that Each 1 mmol/L decrease in LDL-C produced by statin therapy was associated with a concurrent reduction of approximately 22% risk in major vascular events (e.g., heart attack, stroke or cardiovascular death). This is further evidence for the importance of statins in both primary and secondary prevention of cardiovascular disease [9-10].

The consistent nature of these findings across different populations and clinical settings underscore the central importance of statins for cardiovascular risk reduction. The totality of evidence from these trials underscores the need to treat high-risk patients with maximal LDL-C lowering in order to be able to detect significant reductions in cardiovascular morbidity and mortality. Accordingly, statin therapy has become a cardiovascular disease prevention and treatment mainstay.[14]

2.2 Previous Related Study:

2.2.1 A cross-sectional community-based study, conducted by Wajid Syed, Department of Clinical Pharmacy, College of Pharmacy, King Saud University, Riyadh, Saudi Arabia in 2023, among people living in Saudi Arabia to assess the knowledge of CVD risk factors using a total of 24-item questionnaires divided into two sections using the Likert scale. Among a sample size of 400, 81.8% of participants (n=296) agreed that high blood pressure was a risk factor for CVD, while more than two-thirds (68.8%; n=249) believed that diabetes was a risk factor for CVD. Furthermore, about the same proportion of respondents ((79.8%; n=289) and (78.7%; n=285)) agreed that physical inactivity and smoking were risk factors for CVD. In addition, the vast majority of them (n=324; 89.5%) believed that regular exercise aids in the prevention of CVD. In contrast, 74.9% (n=271) of individuals agreed that quitting smoking helps prevent CVD. This study indicated that 55.8% (n=202) of respondents had strong knowledge of CVD, while 44.2% (n=160) had inadequate awareness of CVD risk factors and prevention methods [17].

2.2.2 A cohort based cross-sectional study conducted in Iran by Zibaeenejad et al. in 2022, aimed to estimate the prevalence of ASCVD risk factors among Shiraz University employees using a 10-year ASCVD risk predicting estimator. With a

sample size of 1191 Shiraz university employees and their spouses between the ages of 25 and 70 who were enlisted in a prospective cohort study began in 2018 in Shiraz (the capital of Fars province in southwest Iran), results showed that 75.3% of the participants had low risk scores, whereas 13.2% and 2.5% of them had intermediate and high risk scores, respectively. Additionally, it revealed that nearly 15.7% of participants were at intermediate and high risk of developing ASCVD in the next 10 years with greater risk in men [15].

- 2.2.3 A cross-sectional observational study published in the European Journal of Preventive Cardiology by Nicolas Danchin in 2018, was conducted in 452 centers (August 2015 to August 2016) in 18 countries in Eastern Europe, Asia, Africa, the Middle East and Latin America. With a sample of 9049, patients treated for 3 months with any LLT and in whom an LDL-C measurement on stable LLT was available within the previous 12 months. 97.9% of patients were receiving a statin (25.3% on high intensity treatment). Only 32.1% of the very high-risk patients versus 51.9% of the high risk and 55.7% of the moderate risk patients achieved their LDL-C goals. On multivariable analysis, factors independently associated with not achieving LDL-C goals were no (versus lower dose) statin therapy, a higher (versus lower) dose of statin, statin intolerance, overweight and obesity, female sex, neurocognitive disorders, level of cardiovascular risk, LDL-C value unknown at diagnosis, high blood pressure and current smoking. Diabetes was associated with a lower risk of not achieving LDL-C goals [16].

Chapter Three: Methodology

3. 3. Methodology

3.1 Study Design and Location:

This is a prospective cross-sectional study in Dr. Nour El Din Al-Jaber Center, a private cardiology clinic at Sana'a city. The study was conducted from Jan 2024 to June 2024.

3.2 Ethical approval and consent to participate:

Full ethical clearance was obtained from the qualified authorities who approved the study design.

3.3 Sample size and sampling method

All patients coming from different yemeni cities with CVD were interviewed by trained 6th year clinical pharmacy students. From 120 patients who visited the clinic for cardiology services, during the study period using convenience sampling method, a total of 100 patients were selected.

3.3.1 Inclusion and exclusion criteria

All patients with CVD who attended to the private cardiology clinic were included. Patients who refused to participate were excluded from the study.

3.3.2 Study tools

Patients' questionnaire including patients's demographic data, diagnostic data and medications data was prepared; some questions were inserted as yes or no questions, others as multiple choices and the others opened questions.

3.4 Data collection

Thirteen clinical pharmacy students in the final year (6th year of pharmacy) were chosen and trained by a supervisor. Then the investigators were divided into groups distributed over the clinic's working days to interview the patients who visited the private cardiology clinic for cardiology services. The data were collected by interviewing the right patient after having a prescription from the physician

3.5 Statistical analysis

Categorical variables were represented as frequency and percentage. The p-value was > 0.05 , showing normal distribution of the data. All data were analyzed using SPSS Statistics version 21.0 for Windows® (IBM Corp., Armonk, NY, USA). Statistical differences among groups were evaluated using Pearson's chi-squared test. A p-value < 0.05 was considered statistically significant.

Chapter Four: Results

4. Results

4.1 Socio-demographic characteristics of atherosclerotic cardiovascular disease (ASCVD) risk scores in Sana'a city, Yemen

The lifetime ASCVD risk scores were calculated for 44 study patients (68 male and 32 female). The Male frequency with Very High and High ASCVD risk was more compared to female. The lifetime ASCVD risk score found that 38 male compared with 6 female of patients had Very high risk (Table 4.1). Regarding education level, the highest number of the patients 50 were Illiterate followed by Secondary 20. While the lowest number of patients 14 were Primary.

The frequency of patients with Very High and High ASCVD risk is more compared to women. Most patients 65 had history of Qat Chewing, whereas 35, had no Qat Chewing. Most patients 80 were not smoking, whereas 20 of the patients were smokers.

The result in Table 4.1 showed that, 64 of the patients had history of hospital admission

Table 4.1: *Socio-demographic characteristics of atherosclerotic cardiovascular disease (ASCVD) risk scores in Sana'a city, Yemen.*

Characteristics	ASCVD Category				Total
	Very High	High	Moderate	Low	
Gender					
Male	38	15	5	10	68
Female	6	12	2	12	32
Total	44	27	7	22	100
Education Level					
Illiterate	28	17	1	4	50
Primary	3	4	3	4	14
Secondary	8	3	0	9	20
University /Higher	5	3	3	5	16
Total	44	27	7	22	100
Qat Chewing					
Yes	24	21	6	14	65
No	20	6	1	8	35
Total	44	27	7	22	100
Smoking					
Yes	7	8	2	3	20
No	37	19	5	19	80
Total	44	27	7	22	100
History of Hospital Admission					
Yes	29	21	4	10	65
No	13	6	3	12	35
Total	44	27	7	22	100

The following elucidates the different age groups of study sample with 60-69 years interval scoring the highest (18) (Table 4.2)

Table 4.2: Distribution of Sample by Age Groups:

Characteristics	ASCVD Category				Total
	Very High	High	Moderate	Low	
Age					
30-39 years	0	0	2	9	11
40-49 years	3	7	3	8	21
50-59 years	12	12	1	4	29
60-69 years	18	6	1	1	26
70-79 years	9	2	0	0	11
80-89 years	2	0	0	0	2
Total	44	27	7	22	100

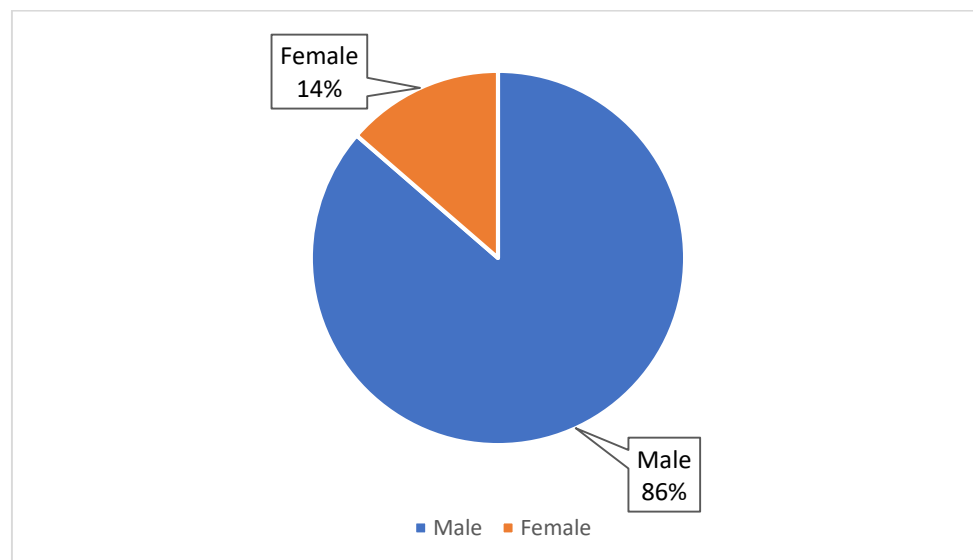


Figure 4.1: Gender Distribution in Sample

4.2 Diagnosis Classification:

Table 4.2. shows that the patients diagnosis profile includes hypertension with and without other risk factors. The result showed that, most of the patients 22 were suffering

of Hypertension and dyslipidemia, while 20 of the patients had Hypertension only. Both Hypertension and dyslipidemia (12) and Hypertension-IHD-Dyslipidemia (8) were very high and high, and the most common risk factors for ASCVD. The frequency of hypertension was higher in 4 patients and low in 15 patients. Hypertension is also an independent risk factor associated with lacunar infarcts. The frequency of Hypertension.HF-DM-Dyslipidemia, Hypertension.DM.IHD, Hypertension.HF-DM-IHD-Dyslipidemia and Hypertension+Dyslipidemia+Stroke were lower than other risk factors and were calculated for one patients for each of them (Table 4.2).

Table 4.3: Diagnosis Profile

Diagnosis	ASCVD Category				Total
	Very High	High	Moderate	Low	
Hypertension	0	4	1	15	20
Hypertension.IHD	1	1	2	1	5
Hypertension.HF-DM -Dyslipidemia	1	0	0	0	1
Hypertension.DM.IHD	1	0	0	0	1
Hypertension.DM.Dyslipidemia.HF	0	0	0	2	2
Hypertension.dyslipidemia	12	8	2	0	22
Hypertension-HF	0	0	0	3	3
Hypertension.HF-DM-IHD-Dyslipidemia	1	0	0	0	1
Hypertension.DM.Dyslipidemia	6	0	0	0	6
Hypertension.DM.Dyslipidemia	7	2	0	0	9
Hypertension.IHD.Dyslipidemia	8	9	1	1	19
Hypertension.HF.IHD.Dyslipidemia	3	2	0	0	5
Hypertension-HF-Dyslipidemia	3	1	1	0	5
Hypertension+Dyslipidemia+Stroke	1	0	0	0	1
Total	44	27	7	22	100

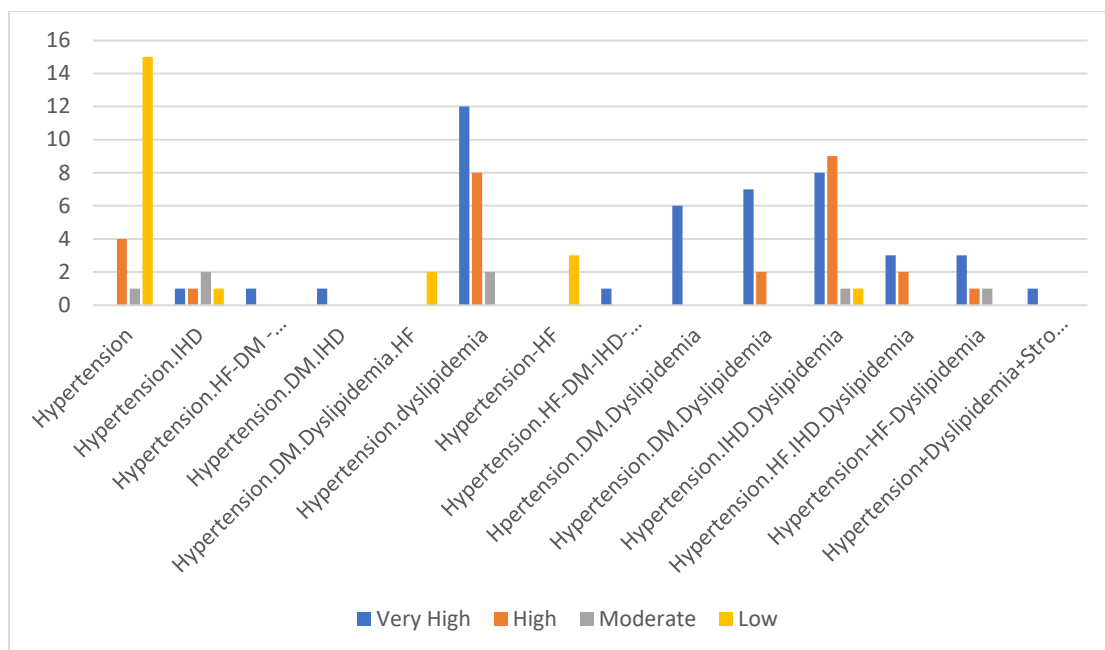


Figure 4.2: Diagnosis Profile

4.3 Body Mass Index Distribution and Blood Pressure of patients with ASCVD

Body mass index distribution varies by patients with ASCVD (Table 4.3). Most patients 40 with ASCVD have a higher prevalence overweight and 26 have obesity. In contrast, 32 have normal body mass and only 2 patients were underweight. Regarding to the Blood pressure of patients with ASCVD the result in table 4. showed that most of the patients 62.9% were hypotensive, more than half of the patients 59 had normal pressure and only 41 who had high pressure.

Table 4.4: Body Mass Index Distribution and Blood Pressure of patients with ASCVD

Characteristics	ASCVD Category				Total
	Very High	High	Moderate	Low	
Body Mass Index					
Underweight	2	0	0	0	2
Normal	14	7	1	10	32
Overweight	18	10	6	6	40
Obese	10	10	0	6	26
Total	44	27	7	22	100
Blood Pressure					
Normal	16	17	6	20	59
High	28	10	1	2	41
Total	44	27	7	22	100

4.4 Drug need based on guidelines * ASCVD Category

The result in Table 4.4 showed that, almost of the patients 69 with ASCVD need drug based on guidelines, while 31 of the patients didn't need drug. Most of those who need drug, 42 received ANTIDYSLIPIDEMIA [statin] high dose, while 9 received AHTN [ACEI-ARB-THIAZID-CCB-BB], 6 received AHTN+statin, 5 received statin+aspirin, only one patient among those who received ARNI +BB FOR[HF] and one received AHTN+aspirin.

Table 4.5: Drug need based on guidelines for patients with ASCVD

Drug need based on guidelines	ASCVD Category				Total
	Very High	High	Moderate	Low	
ANTIDYSLIPIDEMIA[statin] high dose	27	13	1	1	42
AHTN[ACEI-ARB-THIAZID-CCB-BB]	2	3	0	4	9
ARNI +BB FOR[HF]	0	0	0	1	1
NO need	7	5	4	15	31
AHTN+statin	2	2	2	0	6
statin+aspirin	3	1	0	1	5
statin+aspirin+AHTN	2	3	0	0	5
AHTN+aspirin	1	0	0	0	1
Total	44	27	7	22	100

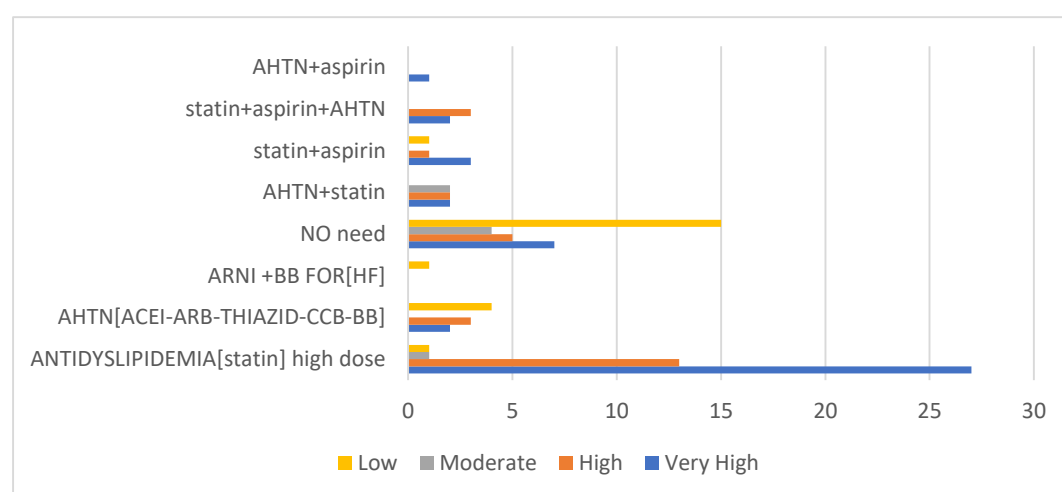


Figure 4.3: Drug need based on guidelines for patients with ASCVD

4.5 Statin Used Based on AHA for patients with ASCVD

The results in the following table shows that 44 patient of Very High risk, 27 of High risk patients, and 7 patients among Moderate risk, and 4 patients of Low risk were using statin based on AHA guidelines and 0 patients from all said categories were not using statin based on AHA guidelines, except for 18 Low risk individuals. On the other hand, when it came to the reason for statin being used, 25 patients among Very High, 18 patients among High, 4 among Moderate, and only 2 among Low risk categories used statin for primary prevention. Further details in Table (5).

Table 4.6: Statin Used Based on AHA for patients with ASCVD

Statin	ASCVD Category				Total
	Very High	High	Moderate	Low	
Statin Used Based on AHA					
Yes	44	27	7	4	82
No	0	0	0	18	18
Total	44	27	7	22	100
Reason of statin used					
primary	25	18	4	2	49
secondary	19	9	3	2	33
NO reason stop	0	0	0	10	10
Continue without	0	0	0	8	8
Total	44	27	7	22	100

4.6 Correlation Analysis Between ASCVD Category and Socio-demographic characteristics

Pearson correlation coefficient was used to find out whether there is a statistically significant correlation or not between the Socio-demographic characteristics (AGE, Gender, Educational Level, Diagnosis, smoke, Chew Qat, History Hospital Admission, SrCr, Height, Weight, Body Mass Index), and ASCVD Category? What is the type of this relationship, is it a positive or negative correlation? This is as follows:

Table 4.7: Correlation Analysis Between ASCVD Category and Socio-demographic characteristics

Socio-demographic characteristics	Pearson Correlation	p.value	Verbal indication
AGE	-.677**	.000	function
Gender	.323**	.001	function
Educational Level	.329**	.001	function
Diagnosis	-.605**	.000	function
Smoke	.008	.933	non function
Chew Qat	-.097-	.337	non function
History of Hospital Admission	-.126-	.212	non function
SrCr	-.175-	.082	non function
Height	-.067-	.507	non function
Weight	-.007-	.946	non function
Body Mass Index	-.003-	.975	non function

The table shows the correlations between ASCVD Category and several other variables using Pearson's correlation coefficient. Here are the key results:

Age: The results show a strong negative correlation between age and risk factors associated with atherosclerosis ($r = -0.677$, $p = 0.000$), indicating that older individuals in the study have higher risk factors. This relationship is statistically significant at the ($p < 0.01$) level.

Gender: There is a positive correlation between gender and risk factors ($r = 0.323$, $p = 0.001$), indicating that gender significantly influences risk factors, and this relationship is statistically significant.

Educational Level: A positive correlation exists between educational level and risk factors ($r = 0.329$, $p = 0.001$), meaning that individuals with lower education levels may have higher risk factors, and this relationship is statistically significant.

Diagnosis: The results show a strong negative correlation between diagnosis and risk factors ($r = -0.605$, $p = 0.000$), indicating that more serious diagnoses are associated with lower risk factors, and this relationship is statistically significant.

Smoking: No significant correlation was found between smoking and risk factors ($r = 0.008$, $p = 0.933$), suggesting that smoking does not significantly affect risk factors.

Qat Chewing: This variable showed a weak negative and non-significant correlation ($r = -0.097$, $p = 0.337$), indicating that qat chewing does not have a significant impact on risk factors.

History of Hospital Admission: No significant correlation was found between the history of hospital admission and risk factors ($r = -0.126$, $p = 0.212$), suggesting that this variable does not significantly affect risk factors.

Serum Creatinine (SrCr): This variable showed a weak negative and non-significant correlation ($r = -0.175$, $p = 0.082$), indicating no major effect on risk factors.

Height: There is no significant correlation between height and risk factors ($r = -0.067$, $p = 0.507$), suggesting that height does not have a significant impact.

Weight: This variable showed no significant correlation ($r = -0.007$, $p = 0.946$), indicating no effect on risk factors.

Body Mass Index (BMI): No significant correlation was found between BMI and risk factors ($r = -0.003$, $p = 0.975$), indicating that BMI does not have a significant effect.

4.7 Correlation Between ASCVD Category and Clinical & Pharmacological Variables

Pearson correlation coefficient was used to find out whether there is a statistically significant correlation or not between the Pharmacological Variables (Glomerular Filtration Rate, Statin Used Based on AHA, LDL-C, Blood Pressure, Current Drugs Used Based on Guideline, Reason of statin used), and ASCVD Category? What is the type of this relationship, is it a positive or negative correlation? This is as follows:

Table 4.8. Correlation Between ASCVD Category and Clinical & Pharmacological Variables

ASCVD Category	Pearson Correlation	p.value	Verbal indication
Glomerular Filtration Rate	-.255-*	.011	function
Statin Used Based on AHA	.768**	.000	function
LDL-C	-.049-	.625	non function
Blood Pressure	-.447-**	.000	function
Current Drugs Used Based on Guideline	-.269-**	.007	function
Drug need based guideline	.285**	.004	function
Reason of statin used	.648**	.000	function

The table shows the correlations between ASCVD Category and several other variables using Pearson's correlation coefficient. Here are the key results:

- **Glomerular Filtration Rate:** The results show a negative significant correlation between glomerular filtration rate and ASCVD category ($r = -0.255$, $p = 0.011$), indicating that a lower filtration rate is associated with increased ASCVD risk, and this relationship is statistically significant.

- **Statin Used Based on AHA:** There is a strong positive correlation between statin use based on AHA guidelines and ASCVD risk ($r = 0.768$, $p = 0.000$), indicating that statin use is significantly associated with reduced risk factors.
- **LDL-C:** There is no significant correlation between LDL-C levels and ASCVD risk ($r = -0.049$, $p = 0.625$), suggesting that LDL-C does not have a notable impact on risk factors in this study.
- **Blood Pressure:** A negative significant correlation was found between blood pressure and ASCVD category ($r = -0.447$, $p = 0.000$), indicating that higher blood pressure increases ASCVD risk.
- **Current Drugs Used Based on Guideline:** There is a negative significant correlation between current drug use according to guidelines and ASCVD risk ($r = -0.269$, $p = 0.007$), indicating that correct drug use reduces risk factors.
- **Drug Need Based on Guideline:** A positive significant correlation is observed between the need for additional drugs and ASCVD risk ($r = 0.285$, $p = 0.004$), suggesting that those requiring more medications are at higher risk.
- **Reason of Statin Used:** The results show a strong positive correlation between the reason for statin use and ASCVD risk ($r = 0.648$, $p = 0.000$), indicating that statin use significantly reduces risk factors.

Chapter Five: Discussion

5. Discussion

This cross-sectional study included 100 individuals of all ages who attended the Dr. Nour El Din Al-Jaber Specialized Cardiology Center during the study period. Among these participants, there were 68 males and 32 females, indicating a higher prevalence of cardiovascular diseases in males compared to females. Notably, males exhibited a higher frequency of very high and high ASCVD risk scores, with 38 males categorized as very high risk compared to only 6 females. These findings contrast with a study by A.J. Walker et al., which involved 8,114 patients aged 75 to 79 years, where 66% were women and 34% were men. This discrepancy may be attributed to age-related factors, as the decline in estrogen levels in women can increase their susceptibility to ASCVD.[18]

In a cross-sectional study conducted in Iran by Faradonbeh et al., which included 418 patients with diabetes aged 30 to 74 years, risk assessments using ASCVD calculators revealed that 28.9% of participants had a risk score of less than 5%, while 59% had a risk score of 7.5% or higher. Our study, along with the Shiraz cohort heart study, similarly indicated that male participants had significantly higher ASCVD scores than females, with scores ranging from 0.50% to 54.30% and a mean 10-year ASCVD risk score of 12.39%, which increased dramatically with age. This difference highlights the need for targeted screening practices, particularly in identifying younger individuals and adolescents who may be at increased risk due to lifestyle factors and genetic predispositions [15].

Regarding educational attainment, 50 patients were illiterate, with 27 classified as very high risk and 17 as high risk. This suggests that education level influences patients' awareness of healthy lifestyles, which can mitigate modifiable risk factors. However, the current literature does not sufficiently address the correlation between education level and increased ASCVD risk.

Moreover, we observed that 65 patients had a history of Qat chewing, which may contribute to a sedentary lifestyle, further increasing cardiovascular disease risk. Most participants were non-smokers, with only 20 identified as smokers, contrasting with Walker et al.'s findings, where the prevalence of smoking was significantly higher in the high-risk group. These findings emphasize the importance of addressing lifestyle

factors in conjunction with pharmacological treatments [18].

Hypertension was present in 22 patients, while 20 had dyslipidemia. Both conditions are critical risk factors for ASCVD. Hypertension is also an independent risk factor associated with lacunar infarcts. Faradonbeh et al. noted that 40.9% of their population of 418 patients were known cases of hypertension, although it was unclear whether this was associated with dyslipidemia. The findings highlight a critical gap in current screening practices for ASCVD risk factors [15]. While early detection is essential for effective intervention, many individuals, particularly children and adolescents, may not be adequately identified as being at risk. This inadequacy can lead to missed opportunities for timely intervention and prevention of future cardiovascular issues. Enhanced screening protocols that include lipid profiles for younger populations, especially those with familial histories of dyslipidemia, are vital for improving outcomes. A study by Kavey et al. (2006) emphasizes the importance of screening children and adolescents for dyslipidemia, noting that early identification can significantly reduce the risk of cardiovascular disease later in life [21].

Regarding blood pressure among patients with ASCVD, 62.9% were hypotensive, while more than half (59 patients) had normal blood pressure, and only 41 had elevated blood pressure. In contrast, Faradonbeh et al. reported that nearly half of their sample diagnosed with hypertension were new cases, with 62.5% lacking any prior history of hypertension [15].

Body mass index (BMI) distribution among ASCVD patients revealed that 40 were overweight and 26 were classified as obese. In contrast, 32 had a normal BMI, and only two patients were underweight. These findings align with Faradonbeh et al., who reported that 65.6% of 1,191 Shiraz University employees and their spouses had elevated BMI, indicating that high BMI is a common risk factor among various conditions, including hypertension, diabetes, low HDL, high LDL, high triglycerides, and high total cholesterol [15].

Our findings regarding statin therapy indicate that the majority of patients requiring medication (69%) were receiving appropriate pharmacological intervention. Among those needing treatment, 42 patients were prescribed high-dose statins, while 9 received antihypertensive medications. This aligns with findings from Walker et al., who reported that 57.5% of the high-risk group received antihypertensive medication.

However, it is crucial to evaluate whether statins are being utilized effectively for both ASCVD prevention and treatment. While many patients were on statins, the need for correct dosing strategies and consistent monitoring remains paramount. Our study showed that only a small number of patients were on combination therapies, such as antihypertensive medications alongside statins, indicating room for improvement in integrated treatment approaches. According to a systematic review by Ghosh et al. (2019), appropriate dosing and regular monitoring of statin therapy are essential for maximizing cardiovascular benefits and minimizing adverse effects. Conversely, a systematic review by Byrne et al. indicated that trends towards reduced all-cause mortality were not statistically significant in two of the included reviews. There is limited evidence regarding the effectiveness of statins for primary prevention, with mixed findings across studies involving participants with varying baseline risks. In contrast, the EUROASPIRE cross-sectional surveys (1999-2013) reported improvements in achieving target LDL-C levels among patients with coronary disease and increased prescribing of lipid-lowering therapy over time according to guidelines, although 75-81% of patients still had LDL-C values exceeding 1.8 mmol/L [19, 20, 23].

Regarding adherence to lipid management guidelines, this study revealed that 44 patients in the very high-risk category, 27 in the high-risk category, 7 in the moderate-risk category, and 4 in the low-risk category were using statins according to AHA guidelines. Interestingly, no patients in the higher-risk categories were non-compliant with these guidelines, except for 18 individuals in the low-risk group. This indicates a generally positive adherence to guidelines among those at higher risk. However, it raises questions about the effectiveness of current guidelines in reaching all patients who could benefit from therapy. The disparity in adherence, particularly among lower-risk individuals, suggests that further education and outreach are necessary to promote guideline compliance across all risk categories. A study by McBride et al. (2015) found that adherence to guideline recommendations for lipid management varies significantly, often influenced by healthcare access and patient education [22].

The results indicate that the most significant factors affecting ASCVD risk are age, gender, and diagnosis. There were strong and statistically significant correlations with these variables. However, factors like smoking, qat chewing, history of hospital admission, serum creatinine level, height, weight, and body mass index showed no significant impact.

The results showed significant correlations between several clinical and

pharmacological variables and ASCVD risk factors. A negative correlation was found between the glomerular filtration rate and risk factors, indicating that a lower filtration rate is associated with higher risk. Statin use based on AHA guidelines showed a strong positive correlation with reduced risk factors. Although LDL-C levels were not significantly correlated with risk, higher blood pressure was associated with an increased risk. Current drug use following guidelines was linked to reduced risk, while the need for additional drugs was associated with higher risk. Additionally, the reason for statin use had a strong positive effect on reducing risk factors.

Chapter Six: Conclusion and Recommendation

6. Conclusion and Recommendation

6.1 Conclusion

This study evaluated the socio-demographic characteristics and ASCVD risk factors among patients in Sana'a city, Yemen. The findings highlight a significant prevalence of very high and high ASCVD risk, particularly among males and those with a history of Qat chewing. Hypertension, often coupled with dyslipidaemia and other comorbidities, emerged as the most common diagnosis. The study also revealed a concerning trend of overweight and obesity among patients, further compounding their ASCVD risk. The majority of patients required pharmacological intervention, predominantly with high-dose statins, underscoring the critical need for effective ASCVD management strategies in this population.

6.2 Recommendations

1. **Targeted Public Health Interventions:** Given the high prevalence of ASCVD risk factors, especially among males and those engaged in Qat chewing, there is a need for targeted public health campaigns to raise awareness and promote healthier lifestyles.
2. **Enhanced Screening and Early Intervention:** Regular screening for ASCVD risk factors, particularly hypertension and dyslipidemia, should be integrated into routine healthcare services. Early detection and management could mitigate the progression to very high-risk categories.
3. **Personalized Treatment Plans:** The variability in ASCVD risk profiles suggests that treatment plans should be individualized, with a focus on the comprehensive management of comorbidities such as hypertension and obesity.
4. **Community-Based Lifestyle Programs:** Implementing community-based programs aimed at promoting physical activity, healthy eating, and smoking cessation could help address modifiable risk factors such as obesity and smoking, which are prevalent in this population.
5. **Policy Support for ASCVD Management:** Policy initiatives should support the availability and affordability of essential medications, including statins, to ensure that all patients at risk of ASCVD receive appropriate treatment according to established guidelines.

6.3 Limitations and strengths

This study presents both strengths and limitations. A primary limitation is the inability to generalize the results to all aspects related to cardiovascular diseases, as not all individuals with similar conditions can benefit from statin drugs, which hindered evaluation. Another limitation was the study design as it lacked temporality.

On the other hand, a notable strength of this study is its pioneering nature, being the first investigation conducted in this focus. Consequently, the findings serve as a valuable foundation for future research endeavors in this area.

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Appendices

Appendix A : Data collection sheet

Screening Of Lipid Panel In Adults And Evaluation The ASCVD Risk Factors.

No. of case () Place the collection of sample

Name of pt. /.....

Age: Sex: M / F Hight/..... wight/.....

Educational level:

() Illiterate

() Primary

() Secondary

() University / Higher

Diagnosis:

Diabetic: () Type I

() Type II

Smoking: () YES

() NO

Qat : () YES

() NO

History of Hospital admission :

() YES

() NO

Scr:

ASCVD risk factor :

Statin use based on

AHA :

.....

LIPID PROFILE:

Date	HDL	LDL	T. Cholesterol

BP:

Date	

Current Drugs:

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المحترم الاستاذ الدكتور/ نور الدين الجابر

تحية طيبة وبعد،

الموضوع/ السماح لطلاب الصيدلة السريرية (Pharm-D) المستوى السادس بتجميع المادة العلمية لاستكمال بحث التخرج

تهديكم الجامعة الإماراتية الدولية أطيب تحياتها متمنية لكم دوام التوفيق والنجاح في أعمالكم.

بالإشارة الى الموضوع أعلاه فإننا نرجو من سيادتكم التكرم بالتوجيه لمن يلزم بالسماح لطلاب المستوى السادس - الصيدلة السريرية (Pharm-D) - للدخول لعيادتكم حتى يتسنى للطلاب أخذ البيانات المطلوبة لخدمة بحث تخرجهم والذي سيحمل عنوان

Screening of lipid panel in adults and evaluation the ASCVD risk Factors

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د. أحمد صالح الظاهري



مرفق لكم أسماء الطلاب



أسماء الطلاب المشاركين بالبحث :

- ايمن الكميم
- ايمن البار
- أسامة عبدالله
- أسماء محمد
- ريان القطاع
- رضية السويدي
- منتهى سنهوب
- ياسر العفيف
- مبارك عثمان
- عبدالرحمن الشلبي
- عيسى الصيرمي
- معتصم فضائل
- عصام العجي

منسقة القسم

Arabic Summary

المقدمة

تُعتبر أمراض القلب والأوعية الدموية قضية صحية عالمية رئيسية ترتبط بشكل أساسي بخلل الدهون، وخاصة ارتفاع مستويات كوليسترول البروتين الدهني منخفض الكثافة (LDL-C). على الرغم من المخاطر المرتبطة بارتفاع LDL-C، يظل العديد من الأفراد غير مشخصين بسبب طبيعة خلل الدهون التي لا تظهر أعراضاً. يمكن أن يقلل الفحص والعلاج الفعال من خطر (ASCVD) بنسبة تصل إلى 50%، ولكن الالتزام بالمبادئ التوجيهية غالباً ما يكون مفقوداً، خاصة بين الفئات الضعيفة.

هدف البحث

سعى البحث إلى تقييم فعالية الطب الوقائي الأولي والثانوي في خفض خطر ASCVD.

المنهجية

أُجريت دراسة مقطعية في مركز نور الدين الجابر للقلب في صنعاء، اليمن، من يناير إلى يونيو 2024. شملت الدراسة 100 مصاب بأمراض القلب لتقييم العوامل الاجتماعية والديموغرافية، وعوامل خطر ASCVD، والالتزام بالعلاج.

النتيجة

أظهر المشاركون أن 68% منهم ذكور، مع معدلات مرتفعة من ارتفاع ضغط الدم (22%) وخلل الدهون (20%). احتاج معظم المرضى (69%) إلى تدخل دوائي، والعديد منهم التزموا بإرشادات جمعية القلب الأمريكية (AHA) لاستخدام الستاتينات.

الاستنتاج

تشدد الدراسة على الحاجة الملحة للتدخلات العامة المستهدفة، وتحسين برامج الفحص، وخطط العلاج الشخصية لإدارة ASCVD بفعالية في اليمن.

الكلمات المفتاحية: الستاتين، أمراض القلب، العوامل المصاحبة



الجمهورية اليمنية
الجامعة الإماراتية الدولية
كلية الطب والعلوم الصحية
قسم الصيدلة السريرية

فحص حالة الدهون عند البالغين وتقييم عوامل خطر لأمراض القلب وتصلب الشرايين

بحث مقدم لقسم الصيدلة السريرية - كلية الطب والعلوم الصحية - الجامعة الإماراتية الدولية لاستكمال نيل درجة البكالوريوس

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عضو هيئة التدريس في الجامعة الاماراتية

