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Original Article

Prevalence of Ischemic Heart Disease and the Associated Risk Factors Among Libyan Patients in Tobruk City

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Abstract

Background: Acute coronary syndrome (ACS) is a common presenting problem with frequent diagnostic uncertainties.
Aims: to assess the prevalence of ischemic heart disease (IHD) and the associated risk factors among Libyan patients in Tobruk City.
Methods: A cross-sectional study was conducted on 40 Libyan patients admitted to the cardiac care unit in TobrukCity. Patients underwent a comprehensive evaluation, including history taking, physical examination, electrocardiography, and blood tests. In addition, data on traditional cardiovascular risk factors such as hypertension, diabetes mellitus, smoking, and obesity were recorded.
Results: The mean age of the 40 patients was 55.61 ± 9.08 years. Males constituted 62.5% (25/40) of the cases, and high-risk age (≥45 years for males and ≥55 years for females) was prevalent in 75.0% of the study population. Obesity was identified in 12.5% (5/40) cases, while overweight status was observed in 47.5% (19/40) cases. Overall, 35.0% (14/40) of the cases were diagnosed as hypertensive. Dyslipidemia was found in 15.0% (6/40) of patients, while diabetes mellitus was present in 27.5% (11/40) of the study population. Multivariate analysis revealed that high-risk age and hypertension were significant independent predictors of ischemic heart disease (IHD). The analysis also showed significant associations between diastolic and systolic blood pressure, smoking habits, and IHD.
Conclusion: This study found a high prevalence of traditional cardiovascular risk factors among patients with suspected acute coronary syndrome in Tobruk, Libya. Early identification and management of these risk factors are crucial for preventing IHD and its complications.

Keywords: Cardiovascular diseases, Acute coronary syndrome, smoking, ischemic heart disease, risk factors

INTRODUCTION

Ischemic Heart Disease is the first-ranked and the most common cause of death in cardiovascular and overall diseases. The estimated prevalence of IHD among people aged ≥18 years in 2013 was 6.1, 6.4, 5.3, and 3.7% in Caucasian, African, Latino, and Asian populations, respectively. The prevalence increased with age and more prevalence was noted among males and IHD increased in patients with potential risk factors such as diabetes mellitus (1). Coronary artery disease is the most common cause of death in cardiovascular disease. The rate of morbidity and mortality is high, and the costs incurred for the treatment process are also very high, thus having a bad impact on the welfare and quality of life in patients, families, and health costs borne by the state. The proper management can reduce the number of losses. (2) Stable coronary artery disease (SCAD) is generally characterized by episodes of reversible myocardial demand/supply mismatch, related to ischemia or hypoxia, which are usually inducible by exercise, emotion, or other stress and reproducible. However, it may also occur spontaneously. (3)

Coronary artery disease is most commonly caused by the inability of atherosclerotic coronary arteries to perfuse the heart due to partial or total occlusion of the coronary arteries. (4) Stable coronary artery disease also includes the stabilized, often asymptomatic, phases that follow an ACS. SCAD has various clinical presentations that are associated with different underlying mechanisms that mainly include: plaque-related obstruction of epicardial arteries, focal or diffuse spasm of normal or plaque-diseased arteries, microvascular dysfunction, and left ventricular dysfunction caused by prior acute myocardial necrosis and/or hibernation. (5) Ischemic means that an organ (e.g., the heart) is not getting enough blood and oxygen. Ischemic heart disease, also called coronary heart disease (CHD) or coronary artery disease, is the term given to heart problems caused by narrowed heart (coronary) arteries that supply blood to the heart muscle. Although the narrowing can be caused by a blood clot or constriction of the blood vessel, it is caused by a buildup of plaque, called atherosclerosis. When the blood flow to the heart muscle is completely blocked, the heart muscle cells die, which is termed a heart attack or myocardial infarction (MI). (6)

PATIENTS AND METHODS

This cross-sectional study was done in the cardiac care unit of 40 Libyan patients in Tobruk City. Moreover, written informed consent was obtained from all patients, and the study was approved by the research ethical committee of the Faculty of Medicine, Tobruk University (Institutional Review Board).

Inclusion criteria:

Patients admitted either for:

1- Elective coronary angiography.
2- Coronary angiography with acute coronary syndrome. 3- Available during the period of data collection.

Exclusion criteria:

1- Seriously ill.
2- Suffering from mental disorders.

Sampling technique and sample size determination:

The participants were chosen by systematic random sampling from the Libyan patients admitted to the cardiac care unit in Tobruk City.

All patients included in the study were subjected to the following:

History taking: including Personal history (name, age**,** and gender), Complaints of present illness: (onset, course, duration).

History of the present illness: including Cardiovascular risk factors such as hypertension, diabetes mellitus, smoking, and prior myocardial infarction. History of addiction, symptoms suggestive of cardiac disease, History of drug intake: current medications. History of systemic disease. Family history of IHD.

A general examination: was performed, with the estimation of body weight and height which was obtained while the patient was putting on light clothes without shoes using a stadiometer and electronic scale in the CCU after confirming the patient's stable condition. Body mass index was calculated as weight (kg)/ height (m2).

Vital signs: included heart rate (beats per minute) and blood pressure measured two separate times using a mercury sphygmomanometer with the cuff at the brachial artery, in both upper limbs, and averaged.

The smoking habit: was stratified according to the number of cigarettes smoked per day and the duration of smoking. Dietary data was collected through interviews regarding type of food (vegetarian or non-vegetarian).

For physical activity: the definition of the Indian consensus group was used according to which a person is considered to have sedentary behavior if he walks less than 14.5 km a week. Body mass index (BMI) was computed as weight in kg/meter^2. Obesity was defined as a BMI of >27 kg/m^2 and overweight was defined as a BMI of >25 kg/m^2. Figures for criteria laid down by the Indian consensus group for being overweight (>23.5 kg/m^2) were also calculated **(8)**. Hypertension was diagnosed when the systolic blood pressure was 140 mmHg or more and the diastolic blood pressure was 90 mmHg or more, as per the guidelines of the British Hypertension Society **(9)**. Twelve lead electrocardiograms (ECGs) were taken using a BPL 108 ECG machine on each individual. Each ECG was reviewed by a cardiologist. A maximum of three visits were conducted for those individuals who could not be contacted during the first visit.

Criteria for the Diagnosis of IHD

The criteria for the diagnosis of IHD were: (a) a history of angina or infarction and previously diagnosed disease, (b) an affirmative response to the Rose questionnaire, and (c) electrocardiographic findings.

The presence of all three criteria was taken as confirmation of the diagnosis of coronary artery disease. The prevalence of coronary artery disease was also classified according to the presence or absence of symptoms. Those who knew they had the disease or showed an affirmative response to the Rose questionnaire were classified as symptomatic patients.

1. **Cardiac and chest examinations:** were done to detect any cause or sequelae of ACS (i.e. congestive heart failure, mitral regurgitation, or ventricular septal defect, etc.….).
2. **Diabetes mellitus was defined according to the American Diabetes Association(7):** Fasting plasma glucose ≥ 126 mg/dL, or 2-hour plasma glucose ≥ 200 mg/dL during standardized 75-g oral glucose tolerance test, or symptoms of hyperglycemia plus nonfasting plasma glucose ≥ 200 mg/dL, or HbA1c ≥ 6.5%.
3. **Obesity was defined as** BMI ≥ 30 Kg/m2 **(8)**
4. **Systemic hypertension was defined as** a usual office blood pressure of 140/90 mm Hg or higher **(9)**.

Data Collection, Processing, and Analysis:

Data were collected manually according to variables of the study mentioned above in a

hard data sheet, then data entry was made according to a unified code. The source of data was the clinical data and measurements.

Statistical analysis

The statistical package for social science (SPSS) software version 23.0 (IBM) has been used to analyze data with the use of Chi-square (and Fisher exact test accordingly) as well as specificity, sensitivity, and predictive values were calculated considering angiography results (any positive result and multi-vessel disease) as a golden standard.

RESULTS AND DISCUSSION

This cross-sectional study was carried out in the cardiac care unit on 40 Libyan patients admitted to the cardiac care unit in Tobruk City to assess the prevalence of ischemic heart disease (IHD) and the associated risk factors among Libyan patients in Tobruk City. All patients underwent diagnostic evaluation of acute coronary syndrome.

Table 1: Gender and High-risk age and ACS

High risk age	ACS		Total
	Acute cardiac condition	Other conditions	
Male	16	9	25
	40	22.5	62.5%
Female	6	9	15
	15.0%	22.5%	27.5%
High risk age	20	10	30
	50%	25%	75%
Low risk age	2	8	10
	5%	20%	25%
Total	55	45	100

Fisher's Exact Test P = 0.025 (Significant)

The study analyzed data from 40 patients with acute coronary syndrome (ACS). The mean age of the patients was 55.61 ± 9.08 years. Males constituted 62.5% (25/40) of the cases, and high-risk age (≥45 years for males and ≥55 years for females) was prevalent in 75.0% of the study population.

Table 2: Obesity, Overweight, Hypertensive, High Systolic Pressure, High diastolic Pressure and ACS

High risk age	*ACS*		*Total*
	Acute cardiac condition	Other conditions	
Obese	2	3	5
	5.0%	7.5.0%	12.5%
Non	20	15	35
	50%	37.5%	87.5%
Overweight	11	8	19
	27.5%	20%	47.5%
Non	11	10	21
	27.5%	25%	52.5%
Hypertensive	11	3	14
	27.5%	7.5%	35%
None	11	15	26
	27.5%	37.5%	65%
High Systolic Pressure	9	3	12
	22.5%	7.5%	30%
Normal range	13	15	28
	32.5%	37.5%	70%
High diastolic Pressure	7	2	9
	17.5%	5%	22.5%
Normal range	15	16	31
	37.5%	40%	77.5%

Obesity was identified in 12.5% (5/40) of cases, while overweight status was observed in 47.5% (19/40) of cases. Hypertension was notable, with high systolic blood pressure recorded in 30.0% (12/40) of cases and high

diastolic blood pressure in 22.5% (9/40) of cases. Overall, 35.0% (14/40) of the cases were diagnosed as hypertensive (Table 2).

Table 3: Dyslipidemia, Diabetic, CKD Stage ≥ III, CRP and ACS (n = 40)

Dyslipidemia	ACS		Total
	Acute cardiac condition	Other conditions	
Dyslipidemia	4	2	6
	10%	5%	15%
Non	18	16	34
	45%	40.1%	85%
Diabetic	3	8	11
	7.5%	20%	27.5%
Non	19	10	29
	47.5%	25%	72.5 %
CKD (eGFR <60)	2	6	8
	5%	15%	20%
CKD (eGFR ≥60)	20	12	32
	50%	30%	80%
CRP Positive	2	6	8
	5%	15%	20.0%
CRP Negative	20	12	32
	50%	30%	80%

Dyslipidemia was found in 15.0% (6/40) of patients, while diabetes mellitus was present in 27.5% (11/40) of the study population. Chronic kidney disease (CKD) stage III or higher was noted in 20.0% (8/40) of cases (Table 3).

Table 4: Multivariate analysis for factors affecting ACS

Factor	B	Wald X^2	P	OR	95% C.I. for OR	
Risky age	2.203	3.820	0.049	9.055	0.994	82.502
Gender	0.126	0.010	0.920	1.134	0.098	13.092
High Systolic Pressure	-0.481	0.000	1.000	0.618	0.000	.
High Diastolic Pressure	-20.087	0.000	0.999	0.000	0.000	.
Hypertension	40.086	0.000	0.999	> 1000.0	0.000	.
Diabetic	-0.385	0.104	0.747	0.680	0.065	7.079
CKD Stage ≥III	-1.105	0.426	0.514	0.331	0.012	9.140
Thromboembolic	-39.644	0.000	0.998	0.000	0.000	.
CRP	-1.060	0.770	0.380	0.347	0.033	3.696
Constant	21.473	0.000	0.999	>1000.0		

B Beta coefficient of regression, OR odds ratio, CI Confidence interval, CKD chronic kidney disease, CRP C reactive protein. Multivariate analysis revealed that high-risk age and hypertension were significant independent predictors of ischemic heart disease (IHD). The study also showed significant associations between diastolic and systolic blood pressure, smoking habits, and IHD (Table 4).

Discussion:

Cardiovascular disease (CVD) is a group of diseases that include both the heart and blood vessels, thereby including coronary heart disease (CHD) coronary artery disease (CAD), and acute coronary syndrome (ACS)**.** During the last decades, the coronary artery disease mortality rate has significantly decreased in developed countries, the fact that could be attributed to both primary and secondary care and prevention programs. Despite the continued efforts to control cardiovascular risk factors, IHD remains the leading cause of death worldwide, in both developed and developing countries**.** [(10)]

Ischemic heart disease is considered a multifactorial disease with a complex pathophysiology generated by the combined effects of genes and the environment. Environmental influences have been widely investigated, but genetic markers have not been fully understood**.** [(11)]

Acute coronary syndrome (ACS) is the acute manifestation of IHD that results from the formation of a platelet-rich thrombus over an atherosclerotic plaque within a coronary artery and/or a plaque rupture. The symptoms and severity of ACSs (unstable angina [UA] and myocardial infarction) vary depending on the degree to which thrombi occlude the coronary arteries**.** [(12)]

Although IHD occurs usually in patients older than 45 years, younger patients having IHD have also been reported. Premature IHD is a growing entity that carries significant morbidity, psychological effects, and financial constraints for both patients and their families. In young people, the role of genetic risk factors is expected to be even more important than that of environmental factors**.** [(13)] This cross-sectional study was carried out cardiac care unit among the Libyan patients in Tobruk city on 50 patients admitted in cardiac care unit among the Libyan patients in Tobruk city to assess the prevalence of IHD and the associated risk factors among the Libyan patients in Tobruk city.

The study analyzed data from 40 patients with acute coronary syndrome (ACS). The mean age of the patients was 55.61 ± 9.08 years. Males constituted 62.5% (25/40) of the cases, and high-risk age (≥45 years for males and ≥55 years for females) was prevalent in 75.0% of the study population. Obesity was identified in 12.5% (5/40) cases, while overweight status was observed in 47.5% (19/40) cases. Hypertension was notable, with high systolic blood pressure recorded in 30.0% (12/40) cases and high diastolic blood pressure in 22.5% (9/40) cases. Overall, 35.0% (14/40) of the cases were diagnosed as hypertensive.

Dyslipidemia was found in 15.0% (6/40) of patients, while diabetes mellitus was present in 27.5% (11/40) of the study population. Chronic kidney disease (CKD) stage III or higher was noted in 20.0% (8/40) of cases.

Multivariate analysis revealed that high-risk age and hypertension were significant independent predictors of ischemic heart disease (IHD). The analysis also showed significant associations between diastolic and systolic blood pressure, smoking habits, and IHD.

Similar to our study, **Zhao et al.,** [(14)] reported that the age of the patients ranged from 19–90 years old with a mean age of 54 years, 77.6% of the patients were males. Also, this agrees

with a study conducted by **Langsted et al., [15]** who reported that a total of 468 participants responded. Male participants comprised 41.2% of the recruited participants (n=193) (20.73 ± 3.32) years and (23.80 ± 7.37) years.

The present study showed that the prevalence of IHD was 6 (12 %), A Lower prevalence was reported by **Al Rawahi et al., [16]** who studied cardiovascular disease incidence and risk factor patterns among Omanis the overall cumulative incidence of CVD was 9.4% with an incidence density of 17.6 per 1000 person-years.

In the present study of cardiovascular risk factors, Binary logistic regression analysis shows that 90 % of IHD can be explained by predictor variables. Diastolic blood pressure, systolic blood pressure, and smoking habits were significantly associated with IHD, whereas no significant relation was found between age, sex, physical activity, body mass index, or diet habits. On the other hand, a study conducted by **Al Rawahi et al., [16]** reported a high prevalence of most of the traditional risk factors such as obesity, poor glycemic control, HTN, dyslipidemia, and albuminuria.

Some of the traditional factors have been excluded in the univariate association with CVD risk. For example, current smoking in the present study showed a low prevalence (74%) and was associated with CVD. A longitudinal study among English patients showed the prevalence of current smoking to be around 34% in men and 25% in women, while in New Zealand it was 15%. [17]

Other global studies even with low CVD incidence have also shown a higher prevalence of smoking among the study groups. [18] Cigarette smoking played a critical role in the development of premature CHD, reducing the age at trial entry by about 1 decade in every risk factor subgroup. In addition, more than 70% of the 12154 patients aged 45 years or younger were current cigarette smokers. Although cigarette smoking is harmful at any age, the increase in relative risk of coronary events in young persons is particularly magnified given their baseline low risk. Furthermore, cigarette smoking acts synergistically with other conventional risk factors, greatly increasing the baseline risk associated with each risk factor individually. Thus, the elimination of cigarette smoking is of dramatic public health importance because it could delay the onset of CHD by a decade [19].

The prevalence of smoking among Libyan diabetic patients was high; this calls for incorporating smoking cessation services within the diabetes care clinics. Has been observed by many studies The overall prevalence of current smoking was 26.4% and past smoking 40.3% [20]. This may be explained by the social and cultural factors towards this habit, these are the potential reasons for the significant association between smoking and CVD observed in this study.

The explanations of results in the present study are centered around that the study population is already a part of a high-risk population that presented for different causes of chest pain and might not diagnosed as ACS for technical reasons. Anyhow, stable angina may be underdiagnosed as it was not an outcome in the present study.

CONCLUSION

Patients presenting with chest pain generally have a high rate of traditional cardiac risk factors. There were significant associations detected between ACS with high-risk age, hypertension, and smoking were significantly associated with IHD. Considering risk factors in handling and diagnosis of cases with chest pain is important. Screening and treatment for risk factors may be worthwhile in preventing cardiac disease.

Recommendations

Considering risk factors in handling and diagnosis of cases with chest pain is important. Screening and treatment for risk factors may be worthwhile in preventing cardiac disease.

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