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Original Article

Demographic, clinical and angiographic profile of coronary artery disease in kurdistan region of Iraq

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Abstract: Introduction: The characters of coronary artery disease with its risk factors and coronary angiograms studied elsewhere revealed differences in different populations. We, here, assess the regional characters of coronary artery disease with its major risk factors and coronary angiographic profile in Duhok, Kurdistan region of Iraq. Methods: We conducted this cross sectional study at the Azadi heart center in Duhok, Iraq. A consecutive sampling procedure was used to enroll a total of 300 adult patients with coronary artery disease (145 men and 155 women) who had undergone coronary angiography. Direct interview was used with designed questionnaire to collect demographic, cardiovascular risk factors and angiographic profiles. Results: The mean patient's age was 55.5 (10.4) years. The most prevalent risk factor was hypertension (55.3%), followed by dyslipidemia (42.7%), type 2 diabetes mellitus (29%), smoking (11%) and ex-smoking (9.3%). Apart from smoking all other risk factors were more frequent in women. Angiographic analysis revealed normal angiograms in (29.3%) versus single vessel disease (23.3%), double vessel disease (14.3%), triple vessel disease (21.3%) and non significant (11.7%). As to the coronary branch involved, the most frequently affected was the left anterior descending artery followed by right coronary artery, left circumflex artery, and left main stem (60.7%, 46.3%, 43.7% and 6% respectively). Conclusion: This study showed that the coronary artery disease tends to occur earlier in our population. Although cardiovascular risk factors were clustered among women, older men showed more aggressive coronary angiographic lesions.

Keywords: Coronary artery disease, cardiovascular risk factors, coronary angiography, Kurdistan, Iraq

Introduction

Cardiovascular diseases account for most of non communicable diseases deaths. It numbers at 17.7 million annually all over the world, particularly in low and middle income countries [1]. Coronary artery disease (CAD) among non communicable is the leading cause of cardiovascular mortality worldwide, with more than 4.5 million deaths occurring in the developing world [2].

Cardiovascular disease ranks first as a cause of disease-related death in Iraq [3-5]. Nowadays, in the developing countries, including Iraq, there are alarming signals of higher rate of CAD in the young age. In addition, the CAD tends to occur earlier in patients with clustering of cardiovascular risk factors and involve the coronary tree with more aggressive lesions [5, 6].

Overall, differences were observed in clinical presentations, risk factors, and angiographic profile of patients with CAD worldwide [7]. Due to the paucity of such studies in the Kurdistan Region of Iraq, this study has been designed to define the regional demographic indicators, main cardiovascular risk factors and angiographic patterns in Duhok, Iraq.

Patients and methods

The study was conducted at the Azadi heart center in Azadi Teaching Hospital, Duhok city, Kurdistan Region of Iraq. The patients were referred from different departments of Duhok district and its hospitals to tertiary Azadi hospi-

Table 1. Baseline characteristics of the study sample (age, cardiovascular (cvs) risk factors and coronary angiograms by gender)

Characteristics	Males		Females		Total		*p*-values*
	No	%	No	%	No	%	
Age Groups (yr)							0.682
20-45	33	22.8	29	18.7	62	20.7	
46-65	94	64.8	105	67.7	199	66.3	
> 65	18	12.4	21	13.5	39	13	
Total	145	100	155	100	300	100	
CVS Risk factors							
T2DM	31	21.4	56	36.1	87	29	0.005
Hypertension	59	40.7	107	69	166	55.3	< 0.001
Dyslipidemia	48	33.1	80	51.6	128	42.7	0.001
Smoking	30	20.7	3	1.9	33	11	< 0.001
Ex-smoking	25	17.2	3	1.9	28	9.3	< 0.001
Coronary angiograms							
Normal angiograms	31	21.4	57	36.8	88	29.3	0.018
Non-significant lesions	14	9.7	21	13.5	35	11.7	
SVD	38	26.2	32	20.6	70	23.3	
DVD	25	17.2	18	11.6	43	14.3	
TVD	37	25.2	27	17.4	64	21.3	

*Based on Chi-square test.

tal. Data was collected from cases clinically diagnosed with CAD (including both chronic and acute coronary syndromes) and underwent coronary angiography in catheterization laboratory of the above center. All patients diagnosed with CAD and underwent for the first time the coronary angiography in Duhok.

Patients with previous coronary intervention, whether diagnostic or therapeutic, and those from outside Duhok governorate were excluded from the study sample. A consecutive sampling procedure was used to enroll all those meeting the eligibility criteria. A cross sectional design was adopted. The investigators interviewed all eligible patients before coronary angiography based on a questionnaire designed specifically to fulfill the required data of the study. It included the following sections: age and gender of cases, main cardiovascular risk factors (Type 2 diabetes mellitus (T2DM), systemic arterial hypertension, dyslipidemia and smoking). The results of coronary angiography of each patient were then recorded.

Cardiac catheterization through selective coronary angiography in multiple views along left ventriculography was performed by qualified cardiologists of the center according to the standard technique. The angiographic findings were interpreted as: (Normal angiogram: no apparent coronary artery stenosis. Non-significant lesion: coronary lesions less than 50% stenosis. Significant lesion: at least 50% stenosis or more involving one or more of major epicardial coronary arteries). The number of vessel involved were noted as single vessel disease (SVD), double vessel disease (DVD), triple vessel disease (TVD), and left main stem (LMS).

Ethical approval and statistical analysis

The study was approved by the ethical committee at the College of Medicine, University of Duhok, Kurdistan Region of Iraq. All patients were informed about the enrollment in the study and formal consent was obtained. All the data were entered into Microsoft Office Excel sheet and transferred to statistical package of social sciences (SPSS Inc. Released 2009. PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc.) for statistical analysis. Descriptive statistics included frequencies, percentages and means (SD). Analytic statistics included the chi square (χ^2). *P*-values were obtained using the uncorrected chi square and a 2-tailed *p*-value. For tables that did not meet Cochran's criteria for accepting the chi-square (no more than 20% of cells have expected value < 5 and no cell has an expected value < 1), the Fisher's exact test was used. The level of statistical significance was set at a p value ≤ 0.05.

Results

The study sample included 300 patients whose mean age was 55.5 (10.4) years comprising (145) men and (155) women. Most of the patients (66.3%) were in the age group (46-65 years). For all the included age groups gender differences were minor and didn't achieve statistical significance (*p*-value = 0.682) as shown in **Table 1**.

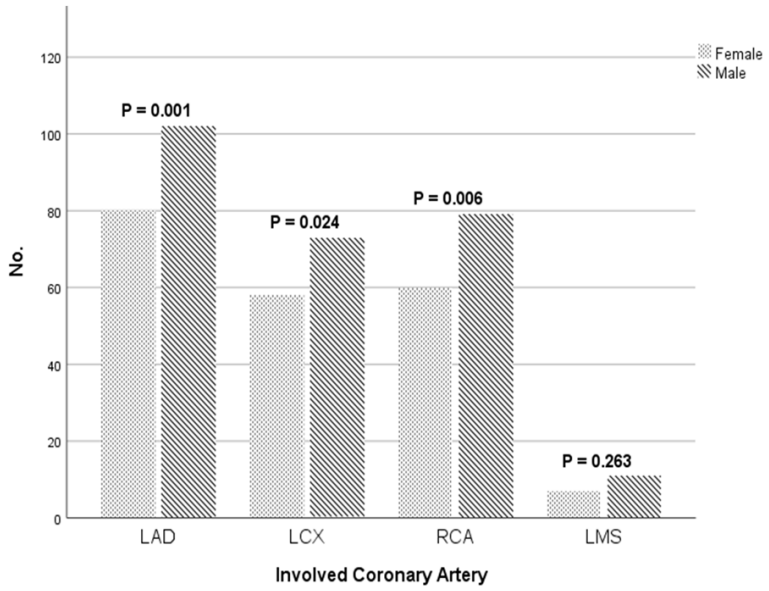

Figure 1. Sample study by major epicardial coronary arteries. The highest affected vessel was LAD (60.7%) followed by RCA (46.3%) then LCX (43.7%) and lastly was LMS (6%).

As to the prevalence of risk factors, the study sample revealed that the highest prevalence was that of hypertension (55.3%), followed by dyslipidemia (42.7%) and T2DM (29%). Apart from smoking and ex-smoking, all other risk factors (T2DM, hypertension and dyslipidemia) were higher among women than men. All comparisons proved statistically significant. *P*-value ≤ 0.005 as shown in **Table 1**.

Regarding the number of affected vessels, the study showed that the rate of normal coronary angiograms was (29.3%). The SVD constituted the highest percentage (23.3%) and followed by TVD (21.3%) and DVD (14.3%). Prominent gender differences were seen; namely, a high rate of TVD in men (25.2% vs. 17.4%) in women contrasting with a lower percentage of normal angiography (21.4% vs. 36.8%) as shown in **Table 1**.

Assessing the differential involvement of coronary tree, the LAD involvement constituted the highest percentage (60.7%) and was followed by very close percentages for RCA and LCX (46.3% and 43.7% resp.). The LMS was (6%). All the percentages were higher on the men side with statistically significant differences except for the LMS as shown in **Figure 1**.

In the age group > 65 years, TVD, DVD and LMS had higher rates of the affected vessels compared to younger. Statistical analysis revealed highly significant differences between the age groups except for LMS (*P*-value 0.322) as shown in **Table 2**.

According to studied risk factors, T2DM, ex-smoking, and smoking were most associated with LMS involvement (50%, 25%, 16.7% resp.). They were statistically on borderline of significance (*p* value = 0.05). Hypertension was mostly associated with LCX (60.4%), followed by RCA and LMS with close percentages (58.9% and 58.3% resp.) which did not achieve statistical significance. Dyslipidemia was mostly associated with LCX (45.9%), but the differences with LAD, RCA and LMS did not achieve statistical significance (*p* value = 0.58) **Table 3**.

Studying the relationship between individual risk factors and the number of affected vessels, the study revealed that TVD was most common among hypertensive patients (59.4%) followed by dyslipidemia (43.8%) T2DM (40.6%) and ex-smoking (15.6%). A normal coronary tree was fewer among T2DM (18.2%) compared to hypertension and dyslipidemia as in **Table 4**.

Discussion

Coronary artery disease is widely prevalent both in the developed and developing countries and continues to be a leading cause of mortality despite recent advances in diagnostic facilities and treatment modalities [8, 9]. The study sample included 300 patients with slightly more women than men (155 and 145 respectively). The age of our patients ranged from 33-83 years with a mean (SD) of 55.5 ± 10.4 years which was similar to that studied by Saif *et al* and Jafary *et al* [51.1 ± 11.4 and 52 ± 10.8] respectively [10, 11].

Regarding the number of affected vessels, this study showed that while normal coronary angiography amounted to (29.3%), SVD constituted the highest percentage (23.3%), followed by

Table 2. Age groups by affected vessels

Coronary Vessels No.	Age (20-45 yr)		Age (46-65 yr)		Age > 65 yr		Total		*P*-values
	No	%	No	%	No	%	No	%	
Normal	33	53.2	51	25.6	4	10.3	88	29.3	< 0.001*
Non significant	4	6.5	28	14.1	3	7.7	35	11.7	< 0.001*
SVD	12	19.4	52	26.1	6	15.4	70	23.3	< 0.001*
DVD	4	6.5	26	13.1	13	33.3	43	14.3	< 0.001*
TVD	9	14.5	42	21.1	13	33.3	64	21.3	< 0.001*
LMS	1	1.6	8	4	3	7.7	12	4	0.322**

*Based on Chi-square Test, *p*-value < 0.001. **Based on Fisher's Exact Test, *p*-value = 0.322.

Table 3. Involved coronary artery branches by Risk factors

CVS Risk Factors	LAD			LCX			RCA			LMS		
	No	%	*P* value	No	%	*P* value	No	%	*P* value	No	%	*P* value
T2DM	44	33.3	0.24*	42	37.8	0.01*	40	37.4	0.58*	6	50	0.11**
Hypertension	73	55.3	0.34*	67	60.4	0.31*	63	58.9	0.49*	7	58.3	1.00**
Dyslipidemia	55	41.7	0.86*	51	45.9	0.58*	46	43	0.64*	5	41.7	1.00**
Smoking	18	13.6	0.02**	12	10.8	0.13**	17	15.9	<0.001**	2	16.7	0.07**
Ex-smoker	17	12.9	0.10*	15	13.5	0.06*	13	12.1	0.27*	3	25	0.09**

*Based on Chi-square Test. **Based on Fisher's Exact Test.

Table 4. Number of affected vessels by risk factors

CVS Risk Factors	Normal		Non-significant		SVD		DVD		TVD		Total		*P* values*
	No	%	No	%	No	%	No	%	No	%	No	%	
T2DM	16	18.2	11	31.4	22	31.4	12	27.9	26	40.6	87	29	0.049
Hypertension	44	50	20	57.1	41	58.6	23	53.5	38	59.4	166	55.3	0.765
Dyslipidemia	37	42	12	34.3	36	51.4	15	34.9	28	43.8	128	42.7	0.366
Smoking	5	5.7	2	5.7	13	18.6	5	11.6	8	12.5	33	11	0.045
Ex-smoker	5	5.7	4	11.4	3	4.3	6	14	10	15.6	28	9.3	0.087

*Based on Chi-square Test.

TVD (21.3%), DVD (14.3%) and Non-significant lesion (11.7%). A study conducted in the Mosul province of Iraq, neighboring Duhok, by Mohammad *et al [6]* found that SVD was most prevalent (35%) followed by DVD and TVD with about (23%) for each. Contrary to these findings, Shah *et al* [12] from Pakistan showed that TVD constituted the highest percentage (45%), followed by DVD (26%) and SVD (18.9%) among patients with CAD. Akanda *et al [13]* documented the following results: TVD (40.66%), followed by DVD (18.6%) and SVD (14.6%). While in a study carried out in India by S. Deora *et al* [14] SVD, DVD and TVD compromised (30.6%, 15.3%, 10.5%) of the study respectively in young patients with acute coronary syndrome.

The differential involvement of major epicardial coronary arteries demonstrated in the present study followed this pattern: LAD lesions registered the highest rate (60.7%); RCA was (46.3%); and LCX was (43.7%). Mohammad *et al [6]* from Iraq found that the most commonly involved vessel was LAD (41.6%), followed by LCX (29.3%), and RCA (25.9%). Shah *et al* [12] also showed a close result for LAD involvement (42%), which was also constituted the highest rate, followed by RCA (32%) and LCX (26%) in cases of CAD.

In the current study, the young age group exhibited high percentage of normal coronary angiograms (53.2%). This finding is comparable to studies performed in the south of Iraq by Nafakhi 2013 study [15] and Bangladesh by Khan et al 2009 study [16]. Yildirim *et al* [17] from turkey showed that SVD occurred more in young age groups below 40 years. Batra *et al*

[18] also found that SVD has the highest prevalence in the young patients (62%) vs. (31.8%) in older. *Kaul* et al [19] found some peculiarities in the younger age at presentation, a high percentage of DVD, and TVD.

In relation with the association between the age group and the number of coronary vessel disease, there were higher and equal percentages of both TVD and DVD (33.3%) and a high prevalence of LMS (7.7%) among older patients with statistical significant differences when comparing to the younger age. These findings match the results reached at by Nafakhi (15) and Mahjoob et al [20] who reported that TVD was more common in elderly patients aged more than 60 years. Rezende et al [21] investigated the severity of coronary artery disease and concluded that atherosclerosis burden increases with progressive aging and many autopsy studies showed that about 50% of people older than 60 years have a more prevalent LMS involvement and a significant coronary artery disease than young patients.

The association of gender to coronary lesions, the study found high percentages of TVD in men (25.2%) vs. (17.4%) in women, but the normal angiogram was higher among women compared to men gender (36.8% vs. 21.4%). SVD and DVD showed only minor gender differences. Islam et al [22] revealed that while (33.5%) of males had DVD, (26.8%) SVD, and (25.3%) multi vessel involvement, female had higher prevalence of normal coronary angiography (35.5%), followed by DVD (23.5%), and (20.6%) for both multi vessel disease and SVD. Giannoglou et al [23] showed that men were more likely to have multi vessels disease and higher rate of LMS at younger age compared to women. Contrary to our study Chiha et al [24] found that TVD was more common in the female.

Studying the relationship between the individual risk factors and the number of affected vessels, this study revealed that TVD was more common among hypertensive patients, T2DM and smoking. Another study by Nafakhi 2012 on cardiovascular risk factors [25] revealed a close association between these risk factors, particularly diabetes mellitus and TVD. Similar to Nafakhi [25] again, we found that smokers had a tendency to present with RCA and MS lesions. Soleimani et al [26] from Iran also figured out that patients with LMS disease were more likely to be the male, old, and have diabetes mellitus or dyslipidemia. And he found that cigarette smoking was an independent predictor of isolated LMS [26].

In regards to the prevalence of cardiovascular risk factors, we concluded that the most prevalent risk factor was hypertension (55.3%), followed by dyslipidemia (42.7%), T2DM (29%), smoking (11%) and ex-smoking (9.3%). Apart from smoking and ex-smoking, all the remaining risk factors; i.e. T2DM, hypertension, and dyslipidemia, were higher among women than in men. The differences proved statistically significant (p-value < 0.005). This finding might be explained by specific cultural trends where in our region, as in certain other cultures, 'big is beautiful'; obesity has recently been perceived as a sign of wealth and well-being. Thus clustering of T2DM, hypertension, and dyslipidemia in women can well be explained by the prevalence of overweight and obesity which predispose to insulin intolerance and metabolic syndrome [27]. Contrary to that, smoking was more prevalent in men. Again, this finding might be explained on the basis of well-known socio-cultural factors. Islam et al [22] agreed that T2DM and dyslipidemia were more common among women, but hypertension and smoking were more common among men. The prevalence of hypertension in our patients was, in addition to dyslipidemia, associated with multi vessels disease. Same findings were confirmed by Natalia et al [28].

Limitations

Although the study contained many variables about the CAD in a part of Eastern Mediterranean area as well as it's the first comprehensive study from Iraq further studies, including a larger sample size, are needed to clarify the relationship between cardiovascular risk factors and angiographic profile. There were no clear diagnostic criteria for the CAD in the study and the diagnosis was made based on the documents of referral to the heart center for coronary angiography. However this might not have a large impact on the findings since all cases were reviewed and diagnosed by the specialist cardiologists of the center.

Conclusions

This study showed that the CAD tends to occur earlier in our population. Although cardiovascular risk factors were clustered and more common among women, older men showed more aggressive coronary angiographic lesions. The T2DM and smoking were associated with multi vessels disease. More efforts should be directed at preventing and controlling cardiovascular risk factors to decrease the prevalence and impact of CAD in communities such as ours.

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Disclosure of conflict of interest

None.

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