

Prevalence of Coronary Atherosclerosis in Babylon Governorate; Histopathological, Postmortem Prospective Study

Ammar Mohammad Khudeer Al-Aamood¹

Nemah H. Al-jubori²

Ali Al-Tmeme³

² College of Medicine , Babylon University



Received 21 December 2014

Accepted 2 February 2015

Abstract

There is no previous postmortem study about coronary atherosclerosis in the Arab Homeland, including Iraq. Coronary atherosclerosis is the leading cause of death worldwide, and represents a major problem in Iraq causing death to many young people suddenly. The purpose of the present study was to evaluate the prevalence and severity of coronary atherosclerosis among Babylon Governorate resident.

This is a prospective randomized cross-sectional study, which included autopsy material from 80 cases collected during the period from 1\11\2013 to 1\7\2014, referred to the Office of Forensic Medicine in Babylon.

The cases were divided into 7 groups according to age. After extracting the heart, three representative specimens from each main coronary artery were obtained for Histopathological Examination, after staining with hematoxylin and eosin (H & E) stains. The atherosclerotic lesions were classified into fibro-fatty and advanced lesions, thereafter the results were subjected to statistical analysis.

The results were as follow: 70% of the cases were males and 30% females, their ages ranged between 13-79 years. More than 60% of cases fallen in the age range 21-40 years.

The overall prevalence of coronary atherosclerosis was 91.25% for all age groups; 92.9% of males and 87.5% of females were affected. This prevalence increased with age progression to become almost 100% after age of 40 years old for both (males and females). Moreover the prevalence for advanced lesions only was (61.25%), also it was increasing with age and becoming 100% after age of 50 years old for both (males and females).

There is an unexpectedly high prevalence of coronary atherosclerosis in Iraqi people, which is the highest in Asia when compared to results of other similar studies conducted in other countries. Also it was observed that atherosclerosis started as early as 17 years old.

An increased prevalence of atherosclerosis was found in the present studied population, specifically the young individuals' accentuate that is necessary to institute the prevention early. It is hoped that the data obtained in this study will be a baseline data for further studies by other investigators throughout all Iraqi Governorates to study atherosclerosis in Iraq overall.

Key words: Coronary, atherosclerosis, prevalence, Babylon

مدى انتشار تصلب الشرايين التاجية في محافظة بابل :دراسة نسيجية مرضية, استباقية, بعد الموت

الخلاصة

لا توجد دراسة سابقة بعد الموت لتصلب الشرايين التاجية في الوطن العربي, شاملا بلدنا "العراق". تصلب الشرايين التاجية هو السبب الرئيسي للموت في العالم, و يمثل مشكلة رئيسية في العراق مسببا موت الكثير من الشباب فجأة. الغرض من هذه الدراسة هو تقييم مدى انتشار وشدة تصلب الشرايين التاجية في سكان محافظة بابل. ان هذه الدراسة ذات مقطع عرضي عشوائي استباقي شملت تشريح ٨٠ جثة جمعت خلال الفترة من ١١\١١\٢٠١٣ الى ١١\٧\٢٠١٤, والتي أحييت الى مركز الطب العدلي في بابل. تم تقسيم الحالات الى ٧ مجاميع حسب العمر.

بعد استخراج القلب, ثلاثة نماذج من كل شريان تاجي قد تم الحصول عليها لغرض الفحص النسيجي المرضي, بعد صبغها بصيغتي الهيماتوكسيلين والايوسين. تم تصنيف آفات العصيدة الى آفات شحمية ليفية وآفات متقدمة, بعد ذلك تم عرض النتائج للتحليل الإحصائي.

النتائج كانت كما يلي: ٧٠% من الحالات كانت ذكور و ٣٠% إناث، تراوحت أعمارهم بين ١٣-٧٩ سنة. أكثر من ٦٠% من الحالات وقعت في مدى العمر بين ٢١-٤٠ سنة. الانتشار الكلي لتصلب الشرايين التاجية كان بنسبة ٩١,٢٥% لجميع المجاميع العمرية، نسبة أصابة الذكور كانت ٩٢,٩% والإناث ٨٧,٥%. يزداد ذلك الانتشار بتقدم العمر ليصبح ١٠٠% بعد عمر ٤٠ سنة لكل من الذكور والإناث. بالإضافة إلى ذلك فإن مدى انتشار الافات المتقدمة لوحدها كان بنسبة ٦١,٢٥% وهو أيضا يزداد بتقدم العمر ويصبح بنسبة ١٠٠% بعد عمر ٥٠ سنة لكل من الذكور والإناث.

أظهرت هذه الدراسة نسبة عالية غير متوقعة من انتشار تصلب الشرايين التاجية في الشعب العراقي، والتي هي الأعلى في آسيا عند مقارنتها مع نتائج دراسات مشابهة أجريت في بلدان أخرى. كما أتضح إن تصلب الشرايين يبدأ مبكراً بعمر ١٧ سنة. إن الانتشار الواسع لتصلب الشرايين الذي وجد في الحالات التي تضمنتها هذه الدراسة، وخصوصاً الشباب الذين هم في مقتبل العمر يؤكد انهم الضروري بدء الوقاية مبكراً. من المؤمل إن البيانات التي تم الحصول عليها في هذه الدراسة ستكون قاعدة بيانات للدراسات اللاحقة للباحثين الآخرين في محافظات العراق كافة لدراسة تصلب الشرايين على صعيد العراق ككل.

الكلمات المفتاحية: تاجي، تصلب الشرايين، انتشار، بابل.

Introduction

Atherosclerosis is a chronic slowly progressive inflammatory process that involves essentially the intimal layer of large and medium-sized arteries of humans and culminates in the formation of atherosclerotic plaques resulting into stenosis or occlusion of these arteries together with weakening of their walls [1, 2, 3, 4]. It begins in childhood, and in the absence of accelerating factors, develops slowly and noiselessly to become widespread in old age [3,4]. Cardiovascular disease in general and coronary heart disease in particular remain the leading cause of morbidity and mortality in developed countries [2,3]. It has been calculated that atherosclerosis is the underlying cause of about 50% of all deaths. Almost all patients with myocardial infarction and most of those with stroke, resulting from cerebral thrombosis, have atherosclerosis [3].

Materials and Methods

Materials: This study represents a prospective randomized cross-sectional study, which included autopsy material from 80 cases collected during the period from 1/11/2013 to 1/7/2014, referred to the Office of Forensic Medicine in Babylon. Age range was 13-79 years. Mean age for males was 36.39 years (SD=14.09), and for females was 34.37 years (SD=16.03).

Methods: Data concerning age, sex and cause of death were obtained. The cases were divided into age groups. A full autopsy was done by expert forensic pathologist. The heart was removed, and putting in 10% formalin solution for fixation for about three days. Crosscutting sections for each main coronary artery were done at 5 mm interval. Three representative specimens from each main coronary artery were obtained for Histopathological Examination, after staining with hematoxylin and eosin (H & E), and the results were subjected to statistical analysis.

The cases were divided into seven age groups by 10 years interval as follow:

- Group 1: 11- 20 years
- Group 2: 21-30 years
- Group 3: 31-40 years
- Group 4: 41-50 years
- Group 5: 51-60 years
- Group 6: 61- 70 years
- Group 7: 71- 80 years

The lesions were broadly divided into two major classes: fibro-fatty and advanced lesions. Morphologically we can describe them under microscopic examination as follow [5]:

- 1- Fibrofatty plaques consist of intimal thickening, a small lipid core, inconspicuous smooth muscle proliferation and extracellular matrix and a few monocytes and macrophages.
- 2- Advanced plaques consist of large lipid pool, necrotic cell debris, inflammatory cells, well-formed fibrous

plaque cap, and sometimes vascularization.
calcifications, with or without neo-

Results

Table (1): Overall prevalence of atherosclerotic lesions per age groups and sex for the three main coronary arteries: (LCA, RCA, and CX)

Age group	No. of cases	+ve for atherosclerosis	Male	female
(11- 20)	7	5 (71.4%)	4 (80%)*	1 (50%)*
(21 - 30)	29	27 (93%)	16 (94.1%)	11 (91.7%)
(31 – 40)	21	18 (85.7%)	15 (88.2%)	3 (75%)
(41 – 50)	11	11 (100%)	10 (100%)	1 (100%)
(51 – 60)	6	6 (100%)	3 (100%)	3 (100%)
(61 – 70)	3	3 (100%)	2 (100%)	1 (100%)
(71 – 80)	3	3 (100%)	2 (100%)	1 (100%)
Total	80	73 (91.25%)	52 (92.9%)	21 (87.5%)

* Note; the % of females or males are taken concerning sex no. in age group

Results (**table 1**) had shown that the prevalence increased with age, to become almost 100% above age 40, as follow:

- ✓ 71.4% of cases in age group 11-20 years.
- ✓ 93% of cases in age group 21-30 years.

- ✓ 85.7% of cases in age group 31-40 years, and
- ✓ 100% of cases in age group 41-50 years, which is unchanged for all the next age groups.

Table (2): Distribution of atherosclerotic lesions in the main coronary arteries according to the age groups and type (grade) of lesion:

Age group	No. of cases	-ve for atherosclerosis	+ve for atherosclerosis	
			Fibro-fatty	advanced
(11-20)	7	2 (28.6%)	5 (71.4%)	0(0%)
(21-30)	29	2 (6.9%)	12 (41.4%)	15 (51.7%)
(31-40)	21	3 (14.3%)	6 (28.6%)	12 (57.1%)
(41-50)	11	0 (0%)	1 (9.9 %)	10 (90.1%)
(51- 60)	6	0 (0%)	0 (0 %)	6 (100%)
(61- 70)	3	0 (0%)	0 (0%)	3 (100%)
(71- 80)	3	0 (0%)	0 (0%)	3(100%)
Total	80	7 (8.75%)	24 (30%)	49 (61.25%)

Analysis of the results reveals that the overall prevalence of severe atherosclerotic lesions (advanced) for all age groups was (61.25%), and it increased with age, as follow:

- ✓ In age group 11-20 years there was no advanced lesions,
- ✓ In age group 21-30 years 51.7% showed advanced lesions,
- ✓ In age group 31-40 years 57.1% showed advanced lesions,

- ✓ In age group 41-50 years 90.1% showed advanced lesions, and
- ✓ Above 50 years 100% showed advanced lesions.

Discussion

In the present study it was observed that, of the 80 cases there were 73 (91.25%) cases affected by one or both atherosclerotic lesions, i.e. (fibrofatty and/or advanced lesion). Of the 73 atherosclerotic cases, 52 cases were males, which equal 92.9% of males, and 21 were females, which equal 87.5% of females as shown in **Table (1)**. These results indicate that the overall prevalence of coronary atherosclerosis in Babylon is 91.25%, which is unexpectedly high comparing to other Asian countries [2, 5, 6, 7]. It is more prevalent in males than females, male/female ratio was approximately 2.5/1 or 5/2. As to the relation of frequency of atherosclerotic lesion with age, our results had shown that the frequency increased with age, to become almost 100% above age 40.

There are no previous postmortem studies in Iraq or other Arab countries on this subject to compare our results with them. However, in Iran, Sayed Abbas Tabatabaei *et al.* studied 80 cadavers with age ranged between 11-50 years and they found that the prevalence of coronary atherosclerosis for both fibrofatty and advanced plaques was (71.2%) in all age groups, and (41.8%) overall prevalence of coronary for advanced plaques only [5].

The overall prevalence in our study for fibro-fatty and advanced lesions was higher by about 20% (91.25%). Moreover the prevalence for advanced lesions only was also higher (61.25%) [**table 2**]. The reason for these differences in figures is that, their study was conducted on selected cases with no history of cardiac diseases and age range below 50 years, while our study included heterogeneous group of cases who died from various causes, and with a wider age range (below 80 years old).

Another study on the frequency of coronary atherosclerosis in India included patients with age range 17–63 years, found that the frequency of coronary atherosclerosis was 86% [6], which is comparable to our results. However, our results remain the highest in Asia compared to other studies [6,7,8,9].

Distribution of atherosclerotic lesions in the main coronary arteries according to the age groups and type (grade) of lesion was shown in **table (2)**. Analysis of the results reveals that the overall prevalence of severe atherosclerotic lesions (advanced) in main coronary arteries for all age groups was (61.25%), and it increased with age.

Our study has shown that; in spite of increasing the prevalence of the advanced lesions with the age in the coronary arteries, they were not detected below the age of 20 years old, and there is sudden increase in the prevalence and severity of lesions after that age **table (2)**. Additionally there is a higher prevalence of atherosclerosis in younger age group when compared to other studies **table (1)**, this is due to higher prevalence of fibrofatty type of lesion **table (2)** in this age group, which may attributed to the higher ecological stress, bad diet habits and smoking.

Conclusions

This study showed unexpectedly high prevalence of coronary atherosclerosis in Iraqi people (represented by Babylon Governorate), Coronary atherosclerosis is more prevalent in males than females, and it is increasing with age progression, and the prevalence becoming 100% after the age of 40 years old. Regarding the severity; the percent of advanced lesions also increasing with age and becoming 100% after the age 50 years old.

The References

1. Essentials of Rubin's Pathology, 5th Edition. Rubin, Emanuel; Reisner, Howard M: Lippincott Williams &

- Wilkins; chapter 10: Blood Vessels. (p.196 – p. 216). (2009).
2. Kumar S, Kumar VA, Kumar N, *et al*, Coronary atherosclerosis- a postmortem histopathological study. Department of Forensic Medicine and Toxicology, B.R.D. Medical College, India. (2012).
3. Harrison's Principles of Internal Medicine By Dan L. Longo, Anthony S. Fauci, Dennis L. Kasper., *et al*. Section 5; Vascular Diseases: Chapter 241 – 247; P. 1983 – 2050.; 18th Edition. Printed by The McGraw-Hill Companies in the United States. (2012).
4. Pathologic Basis of Disease; Robbins and Cotran, Vinay Kumar, 8th/Edition, chapter 11 (Blood Vessels). Copyright at (2010).
5. Seyed Abbass Tabatabaei Yazdi, Alireza Rezaei, Jafar Bordbar Azari, *et al*. Iranian Journal of pathology; Vol. "4", No. 3. [Prevalence of Atherosclerotic Plaques in Autopsy Cases with Non-cardiac Death], "Original Article", pp.101-104. (2009).
6. Nidhi Puri & Prem Kumar Gupta & Jaishree Sharma *et al*: Prevalence of atherosclerosis in coronary artery and internal thoracic artery and its correlation in North–West Indians. Indian J Thorac Cardiovasc Surg 26:243–246. DOI 10.1007/s12055-010-0057-1. (2010).
7. Golshahi J, Rojabi P, Golshahi F. Frequency of atherosclerotic lesions in coronary arteries of autopsy specimens in Isfahan forensic medicine center. J Res med; 1(10):16 - 19. (2005).
8. Waller BF, Catellier MJ, Clark MA, *et al*. Cardiac pathology in 2007 consecutive forensic autopsies. Clin Cardiol;15 (10):760-5. (1992).
9. Sanjeet Kumar, Anoop Kumar Verma ,Navneet Kumar, *et al*. Prevalence of Coronary Atherosclerosis in Different Age Groups: A Postmortem Study. Biomedical Research; 24 (1): 139-141 (2013).