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CORONARY HEART DISEASE IN THAILAND; INCIDENCE IN CHULALONGKORN HOSPITAL

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There has been no valid study on prevalence of coronary ischemic heart disease ever documented in Thailand, although, it is generally held by most physicians that the condition is relatively rare as compared to Western countries. In recent years, however, the disease had been increasingly recognized especially among sedentary population of higher socio-economic status living in a large metropolitan area such as in Greater Bangkok. In 1957 the death rate from all heart diseases combined in Bangkok was 2.4 per cent of the total deaths while in 1965 it was 2.8 per cent.⁽²⁾ On the entire population scale, statistical analysis on total deaths from various causes showed all diseases of coronary artery to be 2.7 per cent in the year 1965 while in 1969 the condition doubled to 5.4 per cent.⁽²²⁾

The present retrospective study preliminary describes the prevalence of coronary heart disease among autopsy population in Chulalongkorn Hospital. Relationship between coronary atherosclerosis to age, sex and the risk factors possibly associated with atherogenesis is also briefly discussed.

Materials and Method

Among 1424 consecutive autopsies performed in the Department of Pathology Chulalongkorn Hospital during the four

year period from January 1968 to December 1971, 31 instances of coronary ischemic heart disease were recorded. There were 543 adults over 20 years of age and 881 younger patients. The coronary atherosclerosis was primarily responsible cause of death in 27 out of these 543 adult patients. The hospital records and autopsy protocols of these 27 cases were analysed including the pertinent findings concerning the risk factors.

The coronary arteries were examined grossly by short segmental transverse cuts, and the severity and extent of atherosclerosis were evaluated by individual pathologist who performed the autopsy. Representative blocks from gross lesions were preserved in 10 per cent buffered formalin and embedded in paraffin. The sections were stained with hematoxylin and eosin, and were studied by one of us (P.T.). Special stains were employed when necessary. Histological examination of heart lesion for topographic relation was also carried out.

Results

During the period of four years, there were 135597 total hospital admissions of which 115303 patients were adult consisting of 33637 men and 101960 women (obstetrics patients included), a ratio of 1:3. Of 1424 autopsies performed at the same period, there were 543 adults in which 27 of

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them (4.9 per cent) died with coronary ischemic heart disease. Twenty-two of 27 patients (81.5 per cent) were male.

The most common age-group is between 61 to 70 years. Sixteen patients (59 per cent) were older than 60 years of age. The youngest patient was a 22 year old alcoholic, and the oldest was an 83 year old man.

There were 22 Thais and 5 Chinese, a ratio of 4.4:1. The overall population of Thai and Chinese living in Thailand is estimated at 6:1. Table 1 illustrates the distribution of sex, age-group of the patients, and race.

Atherosclerosis of each of the three major coronary arteries is given in Table II. The lesion of the left anterior descending artery was responsible for myocardial damage and death of 19 patients. The left circumflex and the right coronary arteries were similarly involved in 2 cases each. The remainder 4 patients had more than one arteries affected. Throm-

botic occlusion was found in 14 cases, being at the left side in ten, and on the right side in four instances.

The various risk factors which may be related to coronary atherosclerosis in these patients of different age-group are given in Table III. Among 19 patients of whom pertinent risk factors were known, 14 had a high blood pressure (above 140/90 mmHg. at one or more times). Nine of these 14 patients were older than 60 years of age. Diabetes mellitus was encountered in nine patients. Seven persons smoked some cigarettes while five were regarded as heavy smokers. The level of serum cholesterol was recorded in eight patients and only of five cases were the level higher than normal. Four of 27 patients were considered obese. All patients lived in Bangkok and were assumed to drink tap water regularly. Other possible risk factors such as status of mental and physical activities, diets and serum uric acid were not available.

Table I: Incidences on sex and race of coronary ischemic heart disease of 27 patients in different age-groups.

Age-Groups (yrs)	Race		Total	Sex		Total
	Thai	Chinese		Male	Female	
31-40	2	1	3	3	-	3
41-50	2	1	3	1	2	3
51-60	5	-	5	5	-	5
61-70	8	1	9	7	2	9
>70	5	2	7	6	1	7
	22	5	27	22	5	27

Table II : Locations of atherosclerosis and thrombotic occlusion responsible for major Myocardial infarction and death of 27 patients.

Artery	Atheroscler	Percentage	Thrombosis	Percentage
Lt. ant. desc.	19	70.4	8	42.1
Lt. Circ.	2	7.4	1	50.0
Rt. Coron.	2	7.4	2	100.0
More than one	4	14.8	3*	75.0

*Once in left anterior descending artery and twice in right coronary artery

Table III : Risk factor distribution among 19 patients with known history.

Age-Groups yrs.	Total No.	R.F.		D.M.**	B.P.	Chol.	Smoking*	B. wt.
		one or more	%					
31-40	2	1	50.0	-	-	-	1	-
41-50	2	2	100.0	2	2	1	-	2
51-60	5	4	80.0	2	3	-	2	1
61-70	4	4	100.0	2	4	2	1	1
>70	6	4	66.6	3	5	2	3	-
	19	15	78.9	9**	14	5	7*	4

R.F. risk factors, D.M. diabetes mellitus, Chol. cholesterol,

*Five cases were heavy smokers.

****Six** cases were clinically diabetic, the remainder were subclinical.

Discussion

In comparison to reports from other countries (11,13,20,21,23), the incidence of 4.9 per cent of coronary inchemic heart disease in autopsy population (age-adjusted), is low. Among the Europeans and Americans, the Greeks and Italians are most fortunate, yet their figures are still much higher than our, being around 20 per cent of the total deaths from all causes. The Dutchs, Finns and Americans are less fortunate. Their incidences are 32, 36 and 45 per cent respectively. (11,23) The percentage of Japanese died of coronary heart disease was 9 per one hundred patients. Even this figure of our neighbour is still higher than our. Infact, the only racial stock so far studied which has a lower incidence than reported in this study is the Bantu in Africa especially those isolated groups living in Somalia, Kenya and Tanzania.(25)

The peak prevalence on age of the patients having coronary heart disease in 22 Thais was the same as the peak age incidence of both Thai and Chinese combined. It was in the 61-70 year age-group. This peak incidence on age-group is higher than American and European as well as those people living in the South Pacifics and Indian Subcontinent. (20,21)

In most series, men are affected by atherosclerosis more commonly than women. There are 22 males and five females in this series, a ratio of 4.4:1. However, the total hospital admissions during that period of time showed much female preponderance in a proportion of 3:1. Considering all of these figures together, the ratio of males to females affected by coronary ischemic heart disease would be at about 13:1. This number is thus, much different from data

obtained from other countries including Japan and the South Pacifics where the proportion between males to females was about 2:1. According to Keys (11) the male-female ratios for the American Caucasians and the Finns were close to 5:1.

Atherosclerosis in general has recieved little attention in Thailand, and only a few preliminary reports were documented. Hirst et al⁽⁹⁾ had noted a low incidence of this disease in Bangkok as compare to those people living in Los Angeles. Hypertensive type intracerebral hemorrhage with reference on atherosclerosis of the cerebral vessels in autopsy material, also in Chulalongkorn Hospital, was reported by one of us.⁽²⁶⁾ It was noted then that cerebral hemorrhage was more commonly found than coronary ischemic heart disease in a proportion of 2.2 to 1.8 while in most countries, ischemic heart disease was much more commonly found than cerebral vascular diseases.⁽¹⁷⁾ It was also noted that atherosclerosis of the cerebral vessels appeared to be related to ages of the patients rather than to high blood pressure level per se. This observation seems to be equally relevant to the occurrence of atherosclerosis of the coronary arteries, as evidenced in this study. Fifty-nine patients who had severe atherosclerosis of the heart vessels were older than 60 year of age while almost 70 per cent of these patients in this series had high blood pressure.

It is interesting to observe that the type of lesions commonly found in the atheromas was of fibrous plaque variety. Intimal fat collection, intra or extracellularly, necrosis and calcification were less conspicuous than those reported from other studies. The fact might indicate a possible different pathogenesis in atheromatous formation in Thai people from what have been traditionally upheld.

Hirst et al,⁽⁹⁾ in 1962 has noticed that intimal involment was approximately one half as severe in Bangkok as in Los Angeles.

The two most common risk factors associated with coronary heart disease in our series are hypertension and diabetes mellitus. Hypertension was found in 14 patients, most of them older than 60 years of age while diabetes mellitus was noted in six patients. Evidences of high blood pressure directly and indirectly on atherogenesis have been amply decumented.^(16,17,27) Diabetes mellitus has been known for decades to be closely associated with atherosclerosis, especially in females of younger age-groups.⁽¹⁰⁾

Hypercholesterolemia was recorded in five cases out of eight patients of whom serum level of cholesterol was determined. This is, in fact, the most important and most constant factor, concerning the pathogenesis of atherosclerosis. The high level of serum cholesterol, in turn, is closely related to dietary cholesterol ingested. The concept that serum cholesterol is independent to dietary cholesterol as advocated by Ahrens⁽¹⁾ in 1957 is no more tenable.⁽¹²⁾ Hegsted et al⁽⁸⁾ had found that there was a 5 mg per cent corresponding rise in serum cholesterol for every 100 mg. increment of dietary cholesterol; much so if vitamin D is also supplemented.⁽¹⁴⁾

Somewhat less important on the scale of risk factors as have been reported by many workers concerning nutritional factors and atherogenesis include fatty diets⁽²⁸⁾ as well as high carbohydrate⁽³¹⁾ and low protein diets.⁽¹⁰⁾ All of these dietary factors appeared to have direct influence on free and esterified cholesterol and phospholipid concentration in the blood.⁽²⁸⁾

The Thai food staple is rice supplemented with vegetables, pork, fish, beef and fowl. An average Thai, on a general population scale, consumes about 1770 calories of foods per day. The carbohydrate constitutes 357 gm, proteins 47.2 gms and fat 17.3 gms.⁽¹⁹⁾ In another study from the Northern part of the country,⁽²⁹⁾ carbohydrate was again the main component, constituting 77 per cent of the total calories while protein and fat constituted 12.8 and 10.2 per cent respectively. Milk and milk products while have been used in negligible amount in past decades, become quite popular since the beginning of massive political migration of American soldiers and their dependents. Three large dairy farms have been established and the supply is now almost inadequate. In Bangkok, percentage of calories supplied by fat is more than three times of that in the rural area.⁽⁹⁾ A preliminary study⁽³⁾ on serum cholesterol performed in 172 normal individuals in the school of Medical Technology at Chulalongkorn Hospital, showed mark variation of the cholesterol level between different age-groups and even in the same age-groups. This may be attributed to heterogeneity of the race, sex and socio-economic status of the subjects studied. The level of cholesterol of the subjects in the age-groups 30-39, 40-49, 50-59 and 60-69 year olds ranged from 162-272, 204-294, 202-303 and 171-290 mg per cent respectively. (The standard deviations among these groups were ± 36.85 , ± 33.52 , ± 36.23 and ± 42.16 respectively and the method for determination was by Babson-Spario and Phillips). These figures are rather high for average Asians and Africans (between 125-175 mg per cent⁽¹⁵⁾) and appeared to be disproportional to the diet regime for average Thai people.

Another risk factor found in our group of patients, was cigarette smoking. Seven patients smoked some cigarettes but only five were heavy smokers. Incidence of ischemic heart disease from coronary atherosclerosis is double or triple in heavy smokers as compared to non-smokers.⁽⁵⁾ In those instances of extremely heavy smoker (more than 40 cigarettes per day) who were also physically inactive the chances of coronary ischemic heart are nine folds.⁽⁶⁾

Another risk factor frequently reported to be related to atherogenesis is soft water.⁽¹⁸⁾ Most patients in the group lived in Greater Bangkok where tap water is ordinarily the main source of water supply. According to Dhanamitta et al⁽⁴⁾ Bangkok tap water could be regarded as medium water containing slightly less than 100 parts per millions bicarbonate and about 20 parts per millions calcium. It also contained certain quantities of several other minerals. Calcium had been linked to protective mechanism by causing a higher fecal excretion of bile acids because of its bile acid sequestering effect.⁽¹⁰⁾

Obesity is not well shown in our series of patients. Among 27 cases only four patients may be considered overweight. Recent report by the International Atherosclerosis Project⁽¹⁷⁾ did not find any association between obesity and height to atherosclerosis.

No data on serum uric acid was available in any of the patients in our group. Uric acid is one of the possible risk factor by virtue that it has been found to be elevated in the serum of patient with ischemic heart disease.^(17,27) There

is however an intriguing contradicting finding in which serum uric acid was reciprocally related the smoking. The more the cigarette smoke being inhaled, the lower was the serum uric acid level.

It is well known that sedentary or mental workers are more often affected by atherosclerosis and ischemic heart disease than manual workers.^(6,27) Exercise was shown to offset the delay in fibrinolysis followed a fatty meal⁽⁷⁾. Ryvkin⁽²⁴⁾ states that myocardial infarction occurs two to three times more often among employers than among employees; similar proportion is true also for an urban population as compared to a rural one. We do not have definite data concerning our patients mental and physical activities. All patients, however lived in urban area.

Although this study on mortality rate of coronary ischemic heart disease in Thailand shows a somewhat different pattern to that of the general vital statistics from other countries, yet there are certain similarities. Death from coronary heart disease was far less common in Thailand than most other reports except those from Africa. The ages of the patient at the time of death were relatively older and males were found to suffer from the disease considerably much more frequent than in other countries. The differences between our population and others apparently are not related to differences in relative to total calories intake, serum cholesterol, cigarette smoking, water softness and other factors. Except hypertension and diabetes mellitus, the race and changing social and behavioral pattern seem to be the most importance features in atherogenesis responsible for the increasing number of coronary ischemic heart diseases in Thailand.

Summary

Incidence of coronary heart disease among autopsy population in Chulalongkorn Hospital during the four year period are presented. There are 27 patients among 543 age-adjusted autopsies. The series comprises 22 males and 5 females. There are 22 Thais and 5 Chinese. The most common age-group is between 61-70 year old. Fifty-nine per cent of the series are 60 years of age or older. The lesion responsible for myocardial infarction occurs mostly in the left coronary artery, especially the anterior descending branch which is present in 19 out of 27 patients. Recent thrombotic occlusion is noted in 14 cases.

Discussion on epidemiological aspect including risk factors pertaining to atherosclerosis and coronary ischemic heart disease is given. It is concluded that the disease is apparently increasing and is probably related to changing in social and behavioral pattern of the urban population.

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