ISCHEMIC HEART DISEASE IN SULAIMANIA : A STUDY OF RISK FACTORS

Ali Saeed Mohamad[*], Zhyan Salah Ramzy[@], Majeed H Jamil[#]

[*] Dean of Sulaimania College of Medicine, University of Sulaimania [#] Sulaimania Collage of Medicine, Sulaimania; IRAQ.

Introduction

IHD was defined by W.H.O as "cardiac insufficiency, acute or chronic, arising from reduction or arrest of blood supply to the myocardium in association with disease processes in coronary arterial system".

In the year 2000, the World Health Organization (WHO) recognized IHD as killer number one among ten leading killer diseases worldwide. Ischemic heart disease (IHD) resulted in 7.09 million deaths. Cancers followed with 7.06 million deaths. The prevalence of IHD is rapidly increasing in peoples of Asia, especially of Indians and has become a major contributor to mortality and morbidity in Indians, conservative estimates from India suggest that in 1990, Cardiovascular diseases (CVD) caused 2.39 million deathes [1].

Cardiovascular diseases, IHD in particular, are health problems of global proportion .Coronary heart disease is the overall leading cause of death worldwide and is the number one cause of death in the United State and other industrialized countries [2].

IHD is not only a problem in industrialized countries, populations in non- industrialized countries are now developing lifestyles and diseases risk factors similar to industrialized countries. They have increasing numbers of sedentary occupations, unhealthy diets, tobacco consumption, obesity, and physical inactivity .Due to the current status of IHD in developed countries, as well as increasing incidence rates of IHD in non-developed countries, risk factor analysis and prevention techinques of IHD are necessary throughout the world.

Behavioral risk factors for IHD, however begins in childhood & adolescence, the atherosclerotic process leading to IHD in adults also begins early in life, and is associated with the same risk factors as for adults. An increased focus on children & youth can make a significant contribution toward preventing heart disease in adult

Correspondence to:
Dr. Ali Saeed Mohamad
College of Medicine, University of Sulaimania, IRAQ.

population. Autopsy studies of Korean & Vietnam war casualties showed that 44-77% of young male soldiers (mean age 22 years) had evidence of coronary arteriosclerosis, 5-15% had sever lesion, suggesting that arteriosclerosis began years earlier [3].

A variety of factors have been identified as risk factors for IHD. Some of them are modifiable such as age, sex, and family history. Other risk factors are non modifiable and include cigarette smoking, hypertension, dyslipidemias, diabetes, alcohol consumption, obesity, physical inactivity, type A personality, iron overload, high plasma fibrinogen, and hyperurecemia. The aim of the study, therefore, is summarized as follows:

1.   To identify the main risk factor for IHD in Sulaimania.

To evaluate the strength of each risk factors with respect to IHD in Sulaimani.

Patients and Methods

We started data collection and patients interview at August 24, 2002 in the C.C.U of general hospital. During this period, Data were collected from 249 patients suffering from IHD, having unstable angina and myocardial infarction.

Patients with asymptomatic IHD have been missed. Two other groups are not included in the study; first: patients who arrived to the hospital died with features attributed to IHD; second: those who had silent myocardial infarction. These two groups are fairly large.

Patients with IHD were studied in detail for the following risk factors, age, sex, family history of the disease, smoking, diabetes mellitus, hypertension, overweight and obesity, S. cholesterol, hyperurecemia, physical activity, personality type & psychological factors, and alcohol intake. Diagnosis was performed by consultant physicians who were taking care of the

patients. The study is case control study conducted in Sulaymania General teaching Hospital**.**

Case definition

Cases were diagnosed according to initial manifestations as: -
1. Unstable angina: - chest pain plus ECG changes (ST-segment /T-wave).
2. Myocardial infarction: - typical chest pain plus ST/T/Q changes &/or increased serum enzymes.

Controls

They were of same sex and age (± 2 years), they are not first-degree relatives of patients and not suffering from chest pain. They are hospital inpatients without any previous history of chest pain or ischaemic heart disease. Data collected from the controls were similar to those collected from the cases.

Patients considered positive first-degree family history for premature IHD if they gave history of MI or angina for one of his close relative including parents, sisters, brothers, and off springs.[4] Physical activity was assessed by asking fort both, work related and leisure time activities. We divided the grades of physical activity based on frequency, type (intensity) and duration of the activity. Physical activity is divided therefore into 1.inactive, 2.occasional activity: - regular walking or recreational activity, 3.Light activity: - more frequent activity or exercise less than once/week, 4.Moderate activity: - cycling or very frequent recreational activity or sporting activity once a week, 5.Vigorous activity: - very frequent sporting exercise plus other recreational activities[5].

Alcohol drinking was also recorded, with special emphasis on the type of alcohol & amount per day or week. One drink of alcohol consumption equal to half pint of beer or one glass of wine or one measure of spirit.

Types of alcohol also play a role [6]. One unit of alcohol is 8 grams by weight or 1 CL (10 ml) by volume of pure alcohol. This amount contained in: -

- Half pint of ordinary strength beer or lager.
- A single pub measure (25ml) of Araq (famous national drink).
- A small glass of ordinary strength wine (9% alcohol volume)
- Small pubs measure of sherry or fortified wine [7].

Patients with diabetes or hypertension were defined before entry to the study[8,9]:

Smoking status was defined as follows: 1.Those who never smoked, 2.Those who ever smoked, 3. Ex-smokers; those who quitted smoking for more than one year before the development of MI, and they were considered as non-smokers [10].

Type A personality Strongly associated with IHD, they are action-oriented people who struggle to achieve poor defined goals by means of competitive hostility. They are aggressive, inpatient, upwardly mobile, striving, and angry when frustrated; so all above characteristics & questions have been asked to both Case & Control subjects. They have increased amount of LDL, serum cholesterol, triglycerides, and 17-hydroxy corticosteroids. They are also more prone to hypertension.

Type B personality are opposite of type A, they are relaxed, less aggressive, & less concerned with striving, vigorously to achieve their goals. They are less prone to IHD.

A proform was prepared that incorporated information regarding socioeconomic, anthropometric, and clinical and laboratory data. This included various lifestyles related factors such as social classes, education and whether employed or not. Family history of hypertension, diabetes and premature IHD were asked. Details of major cardiovascular risk factors such as smoking, DM, hypertension, alcohol, physical inactivity and personality type was inquired. The physical examinations emphasized measurement of height, weight, and blood pressure. Blood pressure was measured by the author using a mercury sphygmomanometer, with the patient in the supine position, Readings were taken to the nearest 2 mm Hg. The mean of two measurements, recorded taken five minutes apart, was computed for both the systolic and the diastolic blood pressure; for the diastolic pressure, the fifth-phase Korotkoff sound was assessed [11]. Hypertension was defined as a systolic blood pressure ≥ 140mmHg, a diastolic blood pressure ≥ 90mmHg. Patients weight were recorded, Height, waist and hip circumference was recorded to nearest ½ cm. Then the body mass index (BMI = Kg/m^2)

Fasting blood samples were taken within the first 24 hours for measurement of total serum cholesterol.

Statistical analysis

Descriptive data are expressed as mean $\pm$ SD values and differences between means were tested using Z- test. The distribution of categorical variables between cases and controls were compared by using chi-square test. Statistical significance was assumed if the null hypothesis could be rejected at P = 0.05. Odds ratio and 95% confidence interval (C.I.) were determined.

Results

Table I. Distribution of IHD Cases by age and sex.

Age group	<45	45-54	55-64	65-74	≥75	total
Male	18	26	43	49	11	147
Female	3	13	36	41	9	102
Male:Female ratio	6: 1	2:1	1.19: 1	1.19: 1	1.22: 1	1.45: 1

Table II. Mean of some measurable risk factors and their results & significance.

P-Value	Calculated Z	Controls Mean ± SD	Cases Mean ± SD	Variable
< 0.001**	5.215	128.5 ± 20.4	144.1 ± 26.7	SBP
< 0.001**	3.432	180.88 ± 40.5	200.8 ± 51.5	T.S.Ch.
< 0.01**	2.789	100 ± 35.6	116.5 ± 57.7	FBS
< 0.05*	1.987	23.6 ± 3.9	24.6 ± 3.9	BMI
< 0.001**	4.1426	4.64 ± 1.43	5.43 ± 1.58	S. uric acid

* = Significance
** = Highly Significance

One hundred forty seven 147 (59%) of cases are males, and 102 (41%) are females. 78.9% of males are above 50 years, while 88.23% of females are above 50 years. The largest percentage (36.14%) of cases were noted in the age group 65-74 years, and there is no significant difference between the mean age of both cases and controls.

The male to female ratio of age specific incidence rate decreases with advancing .age from (6:1) in age group <45 to (1.19: 1) in age group 65-74. As a whole male to female ratio in all ages is (1.45:1).

The mean age of cases for males and females was (60) years, and 62 years respectively.

The mean age for all cases is (60.87; average 24-84 years), while the mean age for the control was (60.62). These data are presented in table I.

Table II shows the mean blood pressure of all cases and controls. The mean SBP of cases was 144.12mmHg (± 26.76), while the mean SBP of controls was 128.53mmHg (± 20.41) the differences between the two are statistically highly significant [Z= 5.215, P< 0.001].

One hundred fifty one 151(60.6%) patients have serum levels of cholesterol above 180mg/dl compared to 120 (48.2%) individual among the controls; the difference between patients and controls are statistically highly significant [$\div^2$=7.0779, P<0.01] [O.R.= 1.6564] [95%C.I.=1.161- 2.364]. These data are presented in table II.

Also from table II, the mean total cholesterol of cases when compared with

that of the controls, was higher among cases 200.89mg/dl than in the controls 180.88mg/dl, this difference is statistically highly significant [Z = 3.432, P< 0.001].

Seventy six 76 (30.52%) of the cases were diabetics while 30 (12.04%) of the controls had diabetes (data not presented). The differences between cases and controls was statistically highly significant [÷2=25.3589, P< 0.001] [O.R.= 3.2069] [95% C.I.= 2.01 - 5.117].

The mean of FBS among cases was 116.54mg/dl, comparing with 100.03mg/dl among controls; and the differences are statistically highly significant [Z = 2.789, P< 0.01].

Regarding BMI levels, we divided the subjects to five groups, below 18.5, 18.5-24.99, 25-29.99, 30-33.99, ≥ 34. The last two groups were considered as obese.

The number of cases with BMI (≥ 25) are 119 (47.79%), while it was 94 (37.75%) among controls; the difference between them is statistically significant [÷2= 5.126, P< 0.05] [O.R.= 1.5094] [95% C.I.= 1.056 - 2.157].

Cases have slightly higher BMI (mean 24.69kg/m^2), compared to the controls (23.69kg/m^2). Although the difference was small but it achieved statistical significance [Z= 1.987, P< 0.05].

The pattern of smoking is different between cases and controls, 115 (46.18%) of cases were smokers compared with 78 (31.32%) smokers among controls. This difference is highly significant [÷2= 11.58, P< 0.01] [O.R.= 1.8815] [95% C.I.= 1.305 - 2.7)

The prevalence of hypertension among the total number of cases was 175 (70.28%), while the prevalence of hypertension among controls was only 94 (37.75%) of total control subjects. The differences between these two are highly significant [÷^{2}= 53.04, P< 0. 001]

[O.R.= 3.8995] [95% C.I.= 2.684 - 5.665].

The positive history of premature CAD was found in 55 (22%) of cases, compared to 20 (8.03%) among controls; the difference is statistically highly significant [÷^{2}= 19.229, P< 0.001] [O.R.= 3.2461] [95% C.I.= 1.88-5.606].

Thirty seven (15%) of cases have serum uric acid level above 7 mg/dl, while it was that high in 18(8%) among controls. The difference between the. Two groups is statistically highly significant [÷^{2}= 7.3763, P< 0.01] [O.R.= 2.2398] [95% C.I.= 1.2338 - 4.054].

The mean serum uric acid level among cases was 5.43mg/dl, and in the controls it was 4.64 mg/dl. Although it was slightly higher in the cases but the difference achieved statistical significance [Z= 4.1426, P< 0.001]. Table II.

The prevalence of type A personality among cases was 126 (50.6%) which was higher than that of the controls 71 (28.51%). The difference between the two is statically significant (X^2=25.38, p<0.001) [O.R.= 2.5682] [95% C.I.= 1.773 - 3.721].

Thirty three (22.44%) of male cases are alcohol drinker, while only 7 (4.76%) of controls were alcohol drinker; the difference between the two is statistically significant [÷^{2}=6.6097, P<0.05] [O.R.= 2.7735] [95% C.I.= 1.422 - 5.408].

Sixty five (26.1%) of IHD cases were physically inactive, while only 28 (11.24%) of control subjects are physically inactive. The difference between these two is statistically highly significant. [÷^{2} = 18.1, P< 0.001] [O.R.= 2.7882] [95% C.I.= 1.718 - 4.525].

Discussion

Age & sex

The study findings in respect to age is that the incidence rate of IHD increases

with age in both sexes until the age of 74 then it declines. This study is in agreement with the study of Woo K. Sang (Hong Kong, 1988)[11], but contradict the results of a study done in Baghdad by Shamoo (Baghdad, 1986)[12] in which the incidence increases until the age of 60 then it begins to decline.

The male to female ratio is 1.45:1 (59% of our patients are males and 41% are females). This ratio is relatively close to the ratio found by Sang (Hong Kong, 1988)[11], but it is different from the results found by Shamoo (Baghdad, 1986)[12] in the sense that 72% of his patients were males.

The gap between males & females decrease with increasing age starting from 6:1 in age group less than 45 to 1.19:1 at age group 65-74. This pattern is similar to almost all previous studies done by Sang (Hong Kong, 1988)[11], and Shamoo (Baghdad, 1986)[12].

The mean age of patients in our study is (59.99) years for males and (62.12) for females, which is slightly older than that of Shamoo (Baghdad, 1984) which were (55.6) for males and (58) for females, and younger than that of Woo K. Sang (Hong Kong, 1988)[11] which were (63) years for males and (68) years for females.

This difference may be due to, first, to the differences in the time period at which these studies were conducted, and second, it could be due to shorter life expectancy compared to other developed countries.

The percentage of young age group (<45) years in our study is 8.43%. This is a big share if compared with other studies mostly due to social and psychological stresses related to unstable life environment.

Family history of premature CHD

A familial aggregation of IHD has been reported in several studies and suggested as an independent risk factor.[13] Earlier identification of high-risk families may pave the way for more effective primary preventive measures.

Current study revealed that 22.08% of IHD patients had first degree family history of IHD, and it was statistically highly significant when compared with control subjects. This result is consistent with the results of Al-Bahrani et al., (Baghdad, 1972)[12] who founded that 25.7% of AMI patients have positive family history of premature CHD, and disagree with study done by Ahmed (Almadina Almounawarah 1993) who found that there is no significant association between positive family history of premature IHD & MI [14].

Smoking

Concerning smoking status, it seems that the prevalence of smoking in patients with IHD is decreasing in Iraq; from 71% in Al-Bahrani et al., (Baghdad, 1972) and 60.7% in Shamoo, (Baghdad, 1986)[12] to 46.18% in the present study.

Hypertension

Raised blood pressure is one of the more important established risk factor of IHD[15], there is an accumulating evidence that lowering blood pressure will decrease the risk of CHD in patients with hypertension.

Regarding hypertension, in our study 70.28% of IHD patients were hypertensives (either they have history of hypertension & taking medication or they have readings of $\geq 140/90$ mmHg at least on two occasions), This result is not consistent with the findings of Al-Bahrani et al., (Baghdad, 1972) who found that 33.3% of AMI patients have hypertension. And also different from the results of study done by Shamoo, (Baghdad, 1986) who found that 32.7% of all AMI cases have history of hypertension and taking anti hypertensives. The differences may be due to the difference in methodology, they consider the history of taking drugs

only while in present study we consider both history of taking drugs & also newly diagnosed cases.

Stratification of hypertension according to age groups & sex revealed that it is more common among women in all age groups. This result is different from the result of the study done by National Center for Health Statistics (NCHS) in USA[16], in which hypertension was more common among women more than 50 years of age and less before this age; and consistent with the study done by (Dittrich et al.1988) who found that it was more common among women in all age groups [17].

Diabetes mellitus

Concerning DM, 30.5% of our IHD patients were diabetic, more in women (36.27%) and less in men (26.5). This figure is higher than that in many studies. For example Al-Bahrani et al., (Baghdad, 1972) found that 14% of AMI patients were diabetic. Shamoo, (Baghdad, 1986) found also that 20% of AMI cases were diabetics. But the result we obtained is similar to that of Al-Owaish (Kuwait, 1983) who found that 30% of all AMI patients were diabetic[12]. And also similar to the results obtained by (Grundy et al., 1999) who found that 25% of AMI survivors are diabetics[18].

There is a statistically significant difference between the mean of FBS for cases and controls, which means that there is a significant association between hyperglycemia and incidence of IHD; this result is consistent with the results of study done in Mosul, 1999[19]. Taking in consideration that 30.5% of cases have history of DM compared with only 12% of controls, but most of the cases were either on drug therapy or on dietary restriction or both.

Dyslipidemia

Regarding lipid profile, the mean total cholesterol among cases in the present study is 200.89 mg/dl, This figure is

considered among lowest mean level obtained in similar previous studies (216mg/dl in Shamoo 1986)[12]. (226mg/dl in Al-Owaish 1983)[12]. (249mg/dl in Abdulla Hindi 1996)[20] (260mg/dl in Tibblin et al., 1975)[12].

This relatively low concentration of total cholesterol mean level in our study is partly explained by habitual population diet, which is rich in vegetables and partly by increased awareness about the hard fats.

Most of the 151(60.64%) of our IHD patients are belonging to group who have TC level above 180mg/dl, while the majority, 129 (48.59%) of controls belong to a group of ≤180mg/dl. This indicates a positive association between increased serum TC and incidence of IHD.

Obesity

Regarding overall obesity, our result shows that the mean BMI for patients is significantly higher than that of controls. The number of cases who are overweight or obese (BMI ≥25) are 119 (47%) which is significantly more than that of controls 94 (37%); and also diabetic subjects in our study have higher mean BMI than non diabetics, this may partly explain the higher occurrence of IHD among diabetics. These results are consistent with the results of a study done by Sang in Hong Kong 1988, who found that there is a significant association between overweight and obesity & the occurrence of IHD[11]. The result of the present study differs from that obtained by Ahmed et al., (Almadina Al mounawarah, 1993) in which he found that there is no significant association between obesity & the incidence of IHD.[14]

Hyperuricemia

It is a matter of controversy as to whether uric acid is an independent predictor of mortality in patients with IHD or it represents only an indirect

marker of adverse outcome by reflecting the association between uric acid and other cardiovascular risk factors.

In the present study mean serum uric acid level was within normal (5.43mg/dl) and it was significantly higher than that of controls (4.64 mg/dl).

The number of patients who have levels of serum uric acid above 7mg/dl are 37(15%) which is also significantly more than that of control subjects 18(8%), so our data suggests that increase serum uric acid levels are significantly associated with risk of IHD. This result is consistent with results of many other studies (Puddu PE, et al., 2001)[21], but also disagree with results of study done by (Longo-Mbenza, B. et al. 1999) [22], who found that uric acid do not have a causal role in the development of IHD.

Alcohol consumption

Most of ecological and case control studies allover the world revealed that there is an inverse association between low to moderate alcohol consumption and risk of IHD. But the finding in our study regarding alcohol is quite different, we found that there is a positive association between alcohol consumption and occurrence of IHD. This difference may be due to different drinking pattern and lifestyle aspects correlated with drinking e.g. heavy smoking and heavy meals.

This result agrees with the results of a study done by Hemstrom (Sweden, 1999) in which 15 European countries were included and was done between 1950 and 1995.[23]

Physical inactivity

Several studies have addressed the benefits of physical activity in protection from IHD. Harvard Nurse study showed 30% dramatic reduction in the incidence of IHD by brisk walking for at least 3 hours a week compared with those in the study who did less than 3 hours of brisk walking each week.[24]

In our study physical inactivity is significantly associated with incidence of IHD. This result differs from that of (Kiruna study, Sweden 1996) in which there was non-significant association between IHD & physical inactivity. [25]

Psychological factors

An association between psychological factors and IHD has been acknowledged for decades, but only recently been validated empirically. Depression, anxiety and hostility component of type A personality have been demonstrated to be associated with the risk of IHD [26].

Established behavior pattern of type A personality is characterized by excessive drive and ambition, impatience, competitiveness, sense of time urgency, and poorly contained aggression, is more frequent among people suffering from ischemic heart disease[27].

The National British Institutes of Health declared type A personality as independent risk factors for IHD [28].

In our study, the results have suggested that there is a significant association between type A personality and risk of IHD. This result is consistent with results of study done by (Harry Hemingway 1999) [28] but it differs from the results found by Patrick G, et al., (Washington D.C, 1999) in which there was no positive association between this factor and risk of IHD [26].

Conclusions

1. The major risk factors for IHD in Sulaimani are hypertension, cigarette smoking, DM, increased s.cholesterol, physical inactivity, type A personality and history of first-degree relative for IHD.

2. Smoking habit seems to be decreased among patients with IHD in Iraq, (compared to previous Iraqi studies)

but it remains one of the major risk factors for IHD.

3. Hypertension is the most prevalent risk factor in Sulaimani.

4. Hyperuricemia, overweight & obesity are weak positive risk factors for IHD.

5. Alcohol consumption, unlike many other western studies, associated with increased risk for IHD.

Recommendations

1. To improve health care system, including personnel, equipment and supplies for better detection of risk factors and proper management of patients.

2. To develop a comprehensive program including IHD prevention based on helping young people and adults towards healthier lifestyles. Which can include: -

• Policies to reduce smoking: - for example high taxes on cigarette, advertising help to reduce smoking habit, and to ensure public and working spaces for free smoking to reduce the harmful effect of passive smoking.

• Polices to promote healthy eating: - for example teaching healthy cooking to boys and girls and provision of healthy school food. This approach can be a part of an integrated program for IHD

prevention; this principle then can be extended to other age groups.

• Polices to promote physical exercise: - for example walking and cycling to work, ensure public leisure facilities, and emphasis on sport sessions in primary and secondary schools.

3. Supporting health education programs on smoking, diet and exercise.

4. Screening and treatment of some certain diseases which play as a risk factor in developing IHD in healthy population e.g. hypertension and DM.

5. Establishing a secondary prevention program among those with established disease (good quality rehabilitation for all who requires it).

6. Conducting further evaluations and researches on each risk factor alone, particularly for those that we can not be able to obtain sufficient data for analysis.

7. Establishing a center for collecting a statistical data on chronic diseases including IHD.

Acknowledgement

References

1. Prakash C, Deedwania, CHD in Asian Indians , Cardiology review, march 2002,.19 No.4:17.

2. Sophie Petersen, Mike Rayne, BHF; "CHD statistics" 2002 edition: 11, Public Health Department, University of Oxford.

3. Enos WF, Holmes RG, Beyer J. Coronary disease among US soldiers killed in action in Korea: preliminary report. JAMA 1953; 152:1090-1093.

4. Samim Al-Dabbagh, Dhafir Al-Youzbaki. Risk factors of acute myocardial infarction, a thesis submitted to the council of the college of Medicine University of Mosul; 2001: 34.

5. Goya Wannamethee, A G Shaper; physical activity & stroke in British middle aged men, BMJ 304,7th March 1992: 597-601.

6. Eric B Rimm, Arthur Klatsky, Diederick Grobbee, Meir J Stampfer; Review of moderate alcohol

consumption & reduced risk of CHD: is effect due to beer, wine, or spirits. BMJ, 23rd March, 1996; 312: 731-35.

7. Statistics on alcohol: England, 1978 onwards. Statistical bulletin, July 12, 2001: 19.

8. Feingold KR, Gavin LA. Schambelan M, Schriok E. Sebastion A. Stern JI. DM. Endocrine diseases. Cesil essentials of medicine WB sounders Comp. Philade-

lphia, 3rd edition 1993 , Chapter 9 ,71: 513.

9 Oparil S. Arterial hypertention. Cardiovascular diseases. Cesil essentials of medicine. WB Sounders. Company, Philadelphia, 19th edition, 1992. part VI, 44: 253.

10.Bierman EL, Atherosclerosis and other forms of arteriosclerosis. Disorders of vascular system, Harisons priciples of internal medicine. Mc Graw- Hill inc. New York, 13th edition, 1994;208:1110-14.

11.Woo K. Sang; " AMI in the Chinese in Hong Kong", A thesis submitted to the college of medicine, university of Hong Kong for the degree of M.D, July 1988.

12.Shamoo. Epidemiological study of acute myocardial infarction; A thesis submitted to the college of medicine and the committee of graduate studies of the university of Baghdad July 1986.

13.Nora JJ. Cortscher RH. Spongler RD. et al. Epidemiologic study of early onset of IHD. Circulation, 1980; 61:503-08.

14.Ahmed, A., S. A. Abdelsalam. "A case-control study of the incidence of coronary heart disease risk factors in Saudis at Almadina Almounawarah." Saudi Medical Journal, 1993 14(2): 146-151.

15.Shaper AG. Epidemiology of IHD; Medicine inter-

national, Augest 1989, 68: part 3:2808-13.

16.National Center for Health Statistics. Blood pressure of adults by age & sex, US, Washington D.C., PHS publication No. 1000, series 11, 1964.

17.Dittrich H, Gipplin E, Nicord P et al., AMI in women; influence of gender on mortality and prognostic variables; AmJ cardiology 1988:624-7.

18.Grundy SM, Benjamin IJ, Bruke GL, et al. diabetes and cardiovascular disease: a statement for health care professionals from AHA. Circulation 1999;100:1134.

19.B.Y. Mohammad, Waleed M A, Risk factors of CHD in typeII DM in Mosul. A thesis submitted to the scientific council of medicine for the degree of fellowship of Iraqi commission for medical specialization, College of medicine, university of Mosul, 1999.

20.Adil S. Ghafour, Abdulla Hindi. Acute myocardial infarction in young patients; clinical presentation and risk profile. A thesis submitted to the scientific council of medicine for the degree of fellowship of Iraqi commission for medical specialization, college of Medicine University of Baghdad, October1996.

21.Puddu, P. E., M. Lanti, et al. "Serum uric acid for short-term prediction of cardiovascular disease incidence in the Gubbio popu-

lation Study." Acta Cardiologica, 2001; 56(4): 243-51.

22.Longo-Mbenza, B., E. L. Luila, et al. "Is hyperuricemia a risk factor of stroke and coronary heart disease among Africans?" International Journal of Cardiology, 1999; 71(1): 17-22.

23.Orjan Hemstrom, Percapita alcohol consumption and IHD mortality: university of Stockholm, Sweden 1999: 13-14.

24.Manu V. Chakravarthy, Michael J. Joyner, Frank W. Booth, An obligation for primary care physicians to prescribe physical activity to sedyntary patients to reduce the risk of chronic health conditions, Myoclinic proc, February 2002, 77: 165-173.

25.Torbjorn Messner. IHD in Kiruna- risk factors and squalae. College of medicine Umea university Sweden 1996: 48-62.

26.Patrick G. Omalley, David L. Jones, Irwin M. Feuerstein, et al., Lack of correlation between psychological factors and subclinical CHD. NEJM 2000; 343:1298-304.

27.Radovan Starc, Dorjan Marnsic. Constructing a coronary scale for IHD: case control study. Croatian Med. J 2002; 43:690-695.

28.Harry Hemingway. Psychosocial factors in the aetiology and prognosis of coronary heart disease: systematic review of prospective cohort studies; BMJ, May 29, 1999; 318: 1460-1467.