

Assessment of Coronary Heart Disease Risk Factors and Relation to Nutritional State

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Abstract :

Background: The Coronary heart disease (CHD) is a leading cause of mortality morbidity, and disability in the world. The Framingham's risk score had been used for CHD risk assessment that examine the distribution of lifestyle and emerging risk factors by 10 years risk of CHD. **Aims of study:** To assess the risk of CHD development and to identify the relationship between obesity and the risk of developing CHD. **Patients and Methods:** A hospital-based cross-sectional study has been carried out on (150) patients with no history of CHD, attending to Merjan Teaching Hospital in Al-Hillah City from March to June 2013. Data has been obtained by questionnaire, measurement of anthropometric indices Blood pressure measurement, Electro-Cardio-Graph (ECG), echo study. With laboratory investigations including fasting blood glucose and fasting serum lipid's profile.

Results:

The average age was mean $\pm$ SD (49.64 $\pm$ 11.11). (45%) female and (55%) were male out of which (29%) were diabetic, (22%) were smoker, and (6%) had high total cholesterol level > (above 6.2 mmol/l) , (21 %) have high triglyceride level > (2.26 mmol/l and above), 23% have high LDL-c (4.1mmol/l and above, (71%)have low HDL-c (<1 in male and <1.3 in female), (58 %) hypertension , and (86%)of them were physically inactive, (59%) were obese (BMI >30kg/m²)

The Framinghams risk score as total mean $\pm$ SD were (97.30 $\pm$ 5.65)

The very low risk (<10%) was (47%), low risk (10-15%) was (14%), moderate risk score (15-20%) was (18%), high risk score (>20% risk score) was (21%). There was significant association between that risk and physical inactivity and body mass index and waist/hip ratio. There was significant association between that risk and physical inactivity. There was significant association between coronary heart disease risk and body mass index , (68%) of patients with high risk of development of coronary heart disease were pre-obese and obese .

Conclusion

There is a high prevalence of standard coronary heart disease risk factors so need specific lifestyle modification by the people ,community and specific programs from the health authority to decrease these risk factors.

Key words: coronary arteries, Framham scale, blood pressure,

الخلاصة :

خلفية البحث يعتبر مرض تضيق الشرايين التاجية من الامراض المهمة في دول العالم ويعتبر مقياس فرامهام من المؤشرات المستخدمة للتحديد مؤشر الاصابة بامراض القلب التاجية خلال العشر سنوات والتي تحدد تاثير نمط الحياة اليومي وبعض عوامل الخطورة على الاصابة بالمرض .

اهداف البحث: والغرض من هذه الدراسة لتقييم نسبة عوامل الخطورة التي قد تكون مسؤولة عن الاصابة بامراض الشرايين التاجية في البالغين و العلاقة بين البدانة وخطر الاصابة بها

العينة وطريقة البحث: دراسة مقطعية أجريت لمرضى تم اختيارهم عشوائياً والذين يرتادون مستشفى مرجان التعليمي في مدينة الحلة للفترة الأولى من آذار إلى الثلاثين من حزيران عام 2013. البيانات تم الحصول عليها عن طريق الاستبيانات بسيطة، وقياس مؤشرات قياس الجسم البشري وتشمل مؤشر معامل كتلة الجسم، و محيط الخصر، و نسبة محيط الخصر إلى محيط الورك، قياس ضغط الدم مع أخذ بعض الفحوصات المختبرية فحوصات مختبرية.

النتائج:

كان معدل الاعمار في هذه الدراسة فوق الاربعين سنة واعلى نسبة كانت للرجال (55%)، ووجدت نسبة عالية لعوامل الخطورة المؤدية للإصابة بتصلب الشرايين التاجية لدى عينة الدراسة، حيث سجل (86%) من العينة عدم ممارسة الرياضة وسجل ارتفاع ضغط الدم لدى (58%) من العينة والسمنة 59% وداء السكري 29% إضافة لقلّة نسبة الدهون الجيدة. وكان مؤشر قياس الخطورة 5.65 ± 97.30 وكان 47% من المرضى لديهم مؤشر ضعيف جداً للإصابة بتصلب الشرايين التاجية و 14% لديهم مؤشر ضعيف و 18% لديهم مؤشر متوسط و 21% لديهم مؤشر عالي للإصابة بتصلب الشرايين التاجية. كما وجد علاقة احصائية بين خطر الإصابة وعدم ممارسة الرياضة وبين المرضى الذين لديهم مؤشر عالي لخطر الإصابة مع البدانة حيث وجد 68% من أولئك المرضى لديهم زيادة في الوزن وبدانة.

الاستنتاج:

هناك نسبة عالية من عوامل الخطورة المؤدية لأمراض الشرايين التاجية ومن هذه الدراسة نستنتج الحاجة لتغيير نمط الحياة من قبل المريض نفسه و المجتمع لتقليل هذه المخاطر. الكلمات المفتاحية: الشرايين التاجية، مقياس فرامهام، ضغط الدم.

Introduction:

The National Institute of Health estimates that some 7 million Americans suffer from CHD. Each year more than 600,000 men and women in US die of heart attacks caused by CHD [Kochanek, 2013]. Approximately 3.8 million men and 3.4 million women worldwide die each year from CHD [WHO, 2009]. Coronary heart disease (CHD) is the most common form of heart disease and the single most important cause of premature death in Europe, the Baltic states, Russia, North and South America, Australia and New Zealand By 2020 it is estimated that it will be the major cause of death in all regions of the world. Cardiovascular diseases (CVDs) are the leading cause of death in the United Kingdom, where coronary heart disease (CHD) and stroke cause 150 000 deaths every year. Of these CVD deaths, more than 40 000 occur prematurely, in people younger than 75 years according to United kingdom (UK) National Statistics, 2012. In the UK, 1 in 3 men and 1 in 4 women die from CHD. The death rates from CHD in the UK are amongst the highest in Western Europe (more than 140 000 people) but are falling, particularly in younger age groups; in the last 10 years CHD mortality has fallen by 42% among UK men and women aged 16–64 years. [Scarborough, et al, 2011]. Coronary artery disease is an occlusion (obstruction) of the coronary (heart) arteries resulting from atherosclerosis (arteriosclerosis) [Rezkalla, 2007]. The disease is the most common cause of sudden death, and is also the most common reason for death of men and women over 20 years of age according to American Heart Association, 2007. An estimated 17.3 million people died from CVDs in 2008, representing 30% of all global deaths. An estimated 7.3 million were due to coronary heart disease (CHD) according to World Health Organization, 2011. The major and independent risk factors for CHD are cigarette smoking of any amount, elevated blood pressure, elevated serum total

cholesterol and low-density lipoprotein cholesterol (LDL-C), low serum high-density lipoprotein cholesterol (HDL-C), diabetes mellitus, and advancing age. .

The quantitative relationship between these risk factors and CHD risk has been elucidated by the Framingham Heart Study and other studies. These studies show that the major risk factors are additive in predictive power.[Kochanek;2013, WHO; 2011].

Specified acute coronary events, including unstable angina, acute myocardial infarction, and coronary death, as the primary end point. This combined endpoint probably corresponds closely to the Framingham study's definition of hard CHD. Coronary heart disease (CHD) is the leading cause of death in the United States for men and women[Wilson *etal*;1998]..

Together with cerebrovascular diseases, CHD accounts for 64% of all cardiovascular deaths. There are a number of lifestyle changes that can be implemented to improve the prognosis of patients with stable CHD, including smoking cessation, adoption of a Mediterranean diet, body weight reduction, and increased physical activity.

Smoking is associated with about 54% of cases and obesity 20%, Lack of exercise has been linked to 7–12% of CHD cases[Kivimäki;2012, Wang HX;2007, McCann S.J.H.; 2001).]. Parental history of high blood pressure can also contribute to a higher risk of heart disease in an individual [Wang;2007]. High blood pressure has been shown to be a cause of heart disease. Hypertension affects ≈30% of US adults and approximately doubles coronary heart disease (CHD) risk. Antihypertensive therapy reduces CHD ≈25% [Egan BM;2008, Kannel;2009] ,epidemiological data suggest that treating hypertension to lower goals would reduce residual CHD risk [Mancia ;2011].

The Framingham risk score has been used for coronary heart disease (CHD) risk assessment. The Framingham Risk Score is a gender-specific algorithm used to estimate the 10-year cardiovascular risk of an individual. The Framingham Risk Score was first developed based on data obtained from the Framingham Heart Study, to estimate the 10-year risk of developing coronary heart disease. In order to assess the 10-year cardiovascular disease risk, cerebrovascular events, peripheral artery disease and heart failure were subsequently added as disease outcomes for the 2008 Framingham Risk Score that examine the distributions of lifestyle and emerging risk factors by 10-year risk of CHD . Assessing the risk of developing CHD plays a pivotal role in the prevention and management of the disease. Up until now, several tools have been developed to predict the occurrence of CHD [D'Agostino;2008].

The Framingham risk score, which has been described as the gold standard for measurement of CHD risk utilizes risk factors such as age, sex, blood pressure, smoking, and diabetes and lipid profile in assessing the risk of developing general cardiovascular disease, CHD, stroke and other problems. The Framingham showed that assessment of CHD risk factors was universally applicable in all groups of the populations [Jaquish ;2007, Grundy. *et al.* 2004, LloydJones;1999 and Bes wick A;2006] .

The significant improve the statistics concerning CHD and to alter the course of the leading killer of adults in the community. We must focus our attention on identifying patients at risk for CHD, engage in comprehensive risk factor identification and treatment, increase our efforts toward achieving guideline-recommended LDL-C goals, and use treatment strategies that effectively lower patient risk [Usman A;2006],. So the aims of study: To assess the risk of CHD development and to identify the relationship between obesity and the risk of developing CHD.

Patients and Methods:

A hospital-based cross-sectional study has been carried out on (150) patients with no history of CHD, attending to Merjan Teaching Hospital in Al-Hillah City from March to June 2013.

study design:

This was a hospital-based cross sectional study which conducted to determine the Framingham risk score to predict 10 years risk of coronary heart disease event (coronary death, Myocardial infarction and angina). This risk assessment only applied for people who did not have evidence of established vascular disease. During period of data collection 150 patients were interviewed by questionnaire from those visited the medical department of outpatient clinics of MERJAN Medical City. In addition to determine Framingham risk score, the study was conducted to determined the association between that risk and certain socio-demographic and nutritional factors including (residence, occupation, family history of coronary heart diseases, alcohol intake and physical activity, body mass index, waist to hip ratio and part of lipid profile which not included in score finding)

:Study population

Data was collected from all eligible patients who had given consent to participate by a questionnaire form which prepared to collect information as well as the data was obtained from laboratory reports for those study population . The total patients collected were {181} patients with age ≥ 30 years old. About {17} patients refuse to participate in the study .The main reasons for a non-participant were fatigue or being too ill. Other {14} patients did not bring complete investigation. SO, a total of {150} out of {181} of an eligible patient took part in the study {67 were females, and 83 were males).

Data Collection:

The Inclusion and exclusion criteria for study population were as follow:

All the patients are randomly selected when attending the out patient's clinic in the hospital during the time of study who accepted to participate in the study And Those patients with age more than 30 years old were included in this study. Any patient who had CHD or chronic renal failure, malignancy ,Patients with age > 30 years , pregnant women ,patients who refuse to participate in the study Patient without or incomplete investigation were excluded from the study:)Data collection tools(instruments)

Framingham risk score was determined by certain formula including score number for each age class interval by sex (sex for age) , score number for total cholesterol and HDL-cholesterol values by sex , score number for systolic and diastolic blood pressure by sex and score number for presence or absence of diabetes and smoking habit by sex using a specially designed data sheet to assess the risk factors of C H D of selected patients from out patient's clinic in MERJAN medical city and this sheet was containing:

- 1.Questionnaires.
- 2.Blood pressure and anthropometric measurements (weight, height, BMI, WC, WHR)
- 3.Biochemical investigations ,ECG and ECHO

Data collection took place in three steps. The first step was to interview with patients and to fill out the questionnaires, and the second steps was to perform the anthropometric measurements and the last one to take the biochemical investigations, ECG, and ECHO.

Questionnaires: divided into sections: Section 1: Including socio demographic factors age, gender, residence (rural and urban) , occupation (Government employed, self-employed and un employed), , physical activity (less than 3 hours /week) and smoking, alcohol intake.

Section 2: Including health-related risk factors: - such as history of chronic disease (DM , Hypertension, and treatment for them, and family history of IHD)

section3:Including investigations for blood sugar ,serum cholesterol,HDL, LDL,VLDL,Triglyceride.

Measurements:

Blood pressure

It was measured using well validated and calibrated mercury sphygmomanometer.

The patients must stop smoking, coffee and tea drinking for at least two hours before measuring the blood pressure and routinely we measure while the patients were sitting comfortable (except in DM and elderly patients when they are standing and sitting position) with arm supported at the level of the heart and remove tight clothing from the arm. The cuff of appropriate size (the bladder must encompass more than two third of the arm) was inflated around the arm and then deflated slowly (2mmHg/second), then repeated after five minutes rest and measurement was made to the nearest 2mmHg. Hypertension diagnosed by taking the mean of two readings . hypertension was diagnosed if had a blood pressure reading of systolic ≥ 140 mmHg and /or diastolic ≥ 90 mmHg or patient has been on antihypertensive treatment.

Body mass index ,BMI:

Measured according to the formula of (Wight kg /Height m²) in which the weight was measured in (kilogram) using the balanced digital scale for all subject (wearing light clothing) with an accepted error of 0.1 kg .

Height was measured(in meter) using a flexible tape measures to the nearest 0.5 cm with the patient standing without shoes, heels together and the head in the horizontal plane

Waist circumference (WC) and waist to hip ratio (WHR): The (WC) can be calculated to assess the central obesity, which was taken to the nearest 0.5 cm with a flexible tape measure on the horizontal plane at the level midpoint between the lower rib margin and the iliac crest and because of the absence of any cutoff criteria of WC for Iraqi as indicators of risk of co morbidities, the standard adopted by the NCEP/ATP III criteria of MS were used for this study to assess the risk, and defined as WC ≥ 102 cm for men and ≥ 88 cm for women. The (WHC) measured by the ratio between (WC) to hip circumference (HC) which was taken as the maximal circumference around the buttocks posteriorly and pubic symphysis anterior to the level of a greater trochanter, we depended on the criteria of NCEP/ATPIII for the cutoff points, the ratio of (WHR) was considered as indicators of increased risk of comorbidity if >1 in male and >0.85 in female.

Investigations

After a minimum of ten hours of fasting, five milliliters of venous blood was drawn from the all patients. This blood sample was sent into the laboratory of hospital, centrifuged within 30-45 minutes of collection, subsequently the tests were done included fasting blood glucose (FBG) which is an indicator of risk if $\geq [7]$ mmol/l, also can depend on random blood glucose ≥ 11.1 mmol / L mmol/l or if the patient already on diabetic therapy. Then we assessed the total serum cholesterol (TC), triglyceride (TG) and HDL-C, and the result was an indicator of risk if Optimal total cholesterol: 5.1 mmol/l, LDL cholesterol: 2.6 mmol/l or less. HDL cholesterol: more than 1.0

mmol/l. Triglycerides: 1.7 mmol/l or less. Risk assessment: We deepened in our results on NCEP/ATPIII definition of CHD and the risk score assessment of CHD .

Data Analysis:

Statistical analysis was carried out using SPSS version 18. Categorical variables were presented as frequencies and percentages. Continuous variables were presented as means with their 95% confidence interval (CI). Pearson's chi square (X²) test and fisher exact test were used to find the association between the categorical variables. Independent sample t-test was used to compare means between two groups. A p-value of ≤ 0.05 was considered as significant.

Results

This is across sectional study had been carried out at Merjan Medical City for patients visited outpatients clinic of medical department at the time of data collection, (150) patients had been selected with no history of CHD and data was collected using questionnaire ,anthropometric measures ,ECG, and certain investigations needed for the study. The results were divided into (6) tables and (6) figures as follow:

Table1-shows the means $\pm$ SD for age of the study population were (49.64 ± 11.11) and the systolic blood pressure of (139.7 ± 21.98 mmHg) and diastolic B.P. of (87.21 ± 11.29 mmHg) , while body mass index (weight in kilogram/ height in m²) was (29.81 ± 5.13) ,while the means $\pm$ SD of waist to hip ratio (waist circumference/hip circumference) were (0.93 ± 0.06), regarding the total cholesterol levels the study shows the mean $\pm$ SD of about (4.66 ± 1.04 mmol/l) , LDL mean $\pm$ SD were (3.33 ± 0.99 mmol/l). The Framinghams risk score as total mean $\pm$ SD were (97.30 ± 5.65).

the overall mean age of study population was (49.64 ± 11.11) years old. Majority (55%) were male. There was no significant difference between the mean age of male (51.06 ± 12.26) years old and female (47.90 ± 9.29) years old, ($t = 1.797$, $df = 148$, $p = 0.074$) [figer 1] .

The distribution of study population by study variables as follows smoking habits were (22%), alcohol intake (5%), diabetes mellitus (29%) ,physical inactivity (86%) which is of significant association, hypertension (BP $\geq 140/90$ mmHg) (58%), obesity (BMI > 30) (59%) ,high triglyceride level (≥ 2.26 mmol/l) (21%) , high s. cholesterol (> 6.2 mmol / l) was (6%) , high LDL (23%)(4.1 MMO/L),high VLDL(> 0.645 mmol/l) was(5%), low HDL (< 1 mmol/l for male, < 1.3 mmol / l for female) (71%) [Table-2].

the distribution of study population by 10 years risk score of coronary disease events(myocardial infarction, angina, and coronary death) as follows very low risk($< 10\%$) was(47%), low risk (10-15%) was (14%), moderate risk score (15-20%) was (18%), high risk score ($> 20\%$ risk score)was (21%) [Table 3].

(35%) of study population were in pre-hypertensive stage. Norma(17%) means (syst. < 120 mmHg and dias. < 80 mmHg),Pre-hypertensive (35%) means (systolic120-139mmHg or diastolic 80-89mmHg), stage 1 hypertension(30%) means (sys.140-159mmHg or dias. 90-99mmHg) , stage 2 hypertension (28%) means (syst. ≥ 160 mmHg or dias. ≥ 100 mmHg) [figure 2].The Classification was according to Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure [Chobanian, *et al*,2003].

The distribution of the study population by Body Mass Index (BMI Kg/m²) indicate the majority (59%) of study population were obese (BMI > 30 Kg/m² or more) compared with normal weight(BMI 18.5-24.9 Kg/m²) which were (19%), and pre-obese(BMI 25-29.9 Kg/m²) which were (22%) [Figure 3].

There was no significant association between risk of coronary heart disease development and residence, ($\chi^2 = 2.91$, $df = 3$, $P = 0.405$).The very low risk scores who live

in urban and rural areas were (60%) and (40%) respectively as compared to the high risk scores who live in urban and rural area were (58% and 42%) respectively [figer4]. Figure 5 shows the association of 10 years risk of coronary heart disease event (coronary death, Myocardial infarction and angina) by family history of coronary heart diseases. There was no significant association between that risk and the family history, ($\chi^2=6.921, df=3$, $P=0.074$). The very low risk scores who have family history of CHD were (44%) and absence of family history of CHD were (56%) compared with those with high risk scores of same family history were (32%) and (68%) respectively.

The association of 10 years risk of coronary heart disease event (coronary death, Myocardial infarction and angina) by physical activity. There was significant association between that risk and absence of physical activity $P=0.009^*$ (fisher-exact test). All of patients with high risk (100%) presented with sedentary life style. The very low risk scores who have physical activity and absent physical activity were 23% and 77% respectively compared to those of same group with high risk scores were 0% and 100% respectively [Figure 6].

There was significant association between 10 years risk of development of coronary heart disease by physical inactivity (p-value 0.009^a), meanwhile there was no significant association between risk of coronary heart disease and residence ($\chi^2=1.882, df=2, p\text{-value}=0.390$), occupation ($\chi^2=3.944, df=2, p\text{-value}=0.139$), family history of coronary heart diseases ($\chi^2=0.707, df=2, p\text{-value}=0.702$), and alcohol intake (p-value=0.564^a) between the study groups. Majority of patients with high risk of development of coronary heart disease were not employed (71%), with sedentary life style (100%), without history of alcohol intake (93%) and 68% of them were without family history of coronary heart diseases [Table 4].

The association of 10 years risk of coronary heart disease (high, moderate and low with very low risk) by triglyceride, LDL and VLDL. There was no significant association between coronary heart disease risk and triglyceride, LDL and VLDL with (p-value=0.747, p-value=0.838, p-value=0.564^a) respectively. The high risk group of high triglyceride level (2.26mmol/l) were (26%) and normal and the slightly above normal were (74%) in this group, while the low and very low risk scores triglyceride group were (21%) and (79%) regarding the high and normal level triglyceride, and same for LDL the high level {4.1mmol/l and above for it in the high risk is (19%)}, the optimal and near optimal and border line is 81%, while the v low and low risk score is (24%) for high level and (76%) for the optimal, near optimal and border line level. The VLDL in the high level (>0.645mmol/l) the high risk score were (7%) and the normal level were (93%), while in the v low and low risk groups in the high level group were (3%) and the normal and low level were (97%) [Table 5].

The association of 10 years risk of coronary heart disease (high, not high risk) by body mass index. There was significant association between coronary heart disease risk and body mass index, (68%) of patients with high risk of development of coronary heart disease were pre-obese and obese while the normal BMI in the high risk score group were (32%), the not high risk score pre-obese and obese group were (84%) and the normal BMI in the not high risk group were (16%). There was significant association between the 10 years risk of development of coronary heart disease and the waist/hip ratio (p-value=0.013^a), the high risk score were (20.6%) the mean $\pm$ SD were (0.96 $\pm$ 0.066), while the (not high risk score) group were as follow (79.4%) the mean $\pm$ SD (0.92 $\pm$ 0.064), t-test=(2.52), p-value=(0.013^a for both) [Table 6].

Discussion

Coronary heart disease (CHD) remains the most important disease in the world in the terms of mortality, morbidity, disability and economic loss until 2020 year

[Gazino JM;2006] . The presence and the number of CHD risk factors predict the future cardiovascular events in individuals with such factors. Risk factors reduction is the primary clinical approach to prevent CHD morbidity and mortality .The identification of risk factors provides a means for decreasing CHD risks, through the reduction of modifiable risk factors, and better treatment decisions, through more accurate determination of overall risk status. hypertension, use of tobacco and dyslipidemia are the major risk factors of CHD which act in a synergistic manner. With the prevalence of risk factors for CHD is increasing, and with the clinical and cost burdens mounting, identifying and treating those at risk remains a national priority [Borisoff;2011].

In this study mean age of study population was (49.64 ± 11.11) years old. Majority (55%) were male. There was no significant difference between the mean age of male (51.06 ± 12.26) years old and female (47.90 ± 9.29) years old ($t= 1.797$, $df =148$, $p= 0.074$)(Table 1, figure 1) . The risk of CHD increase with age as proved by many studies due to many factors as atherosclerosis, hormonal changes (estrogen in female), obesity, DM, and hypertension. In our study we found a high percent of risk factors in old ages where the high risk group (risk score was $>20\%$) were (21%) of the studied persons. Men are at greater risk of heart disease than pre-menopausal women. Once past menopause, it has been argued that a woman's risk is similar to a man's risk, although more recent data from the WHO and UN disputes this.[Finegol;2012] . In a study done in Brazil , found that the higher or equal prevalence of several risk factors in women could in part explain the high rates of mortality from CHD in females as compared to males[Vera, 2001]

The study shows that the Framingham's score mean and SD were(7.30 ± 5.65)(Table 1) and the majority of persons studied were in the low and very low risk about (61%) while the high risk group (moderate and high risk group) about (39%) which is also a high percent of persons that need special attention regarding their nutrition and lifestyle modifications to avoid the danger of CHD in the future(Table 3), when compare this to another study in Qatar[Mochtar;2012] ,the results were nearly close to our study where they found the following data: (69.9%) were categorized as low risk, (27.1%) as intermediate risk and (2.9%) as high risk score .

High risk to CHD and mortality associated with obesity . study reported that mortality risk is lowest at BMI 20–25 in non-smokers and at 24–27 kg/m^2 in current smokers, with risk increasing along with changes in either direction[Berrington; 2010].

BMI above 32 kg/m^2 has been associated with a doubled mortality rate among women over a 16-year period. On average, obesity reduces life expectancy by six to seven years, a BMI of 30–35 kg/m^2 reduces life expectancy by two to four years, while severe obesity (BMI $> 40 \text{ kg/m}^2$) reduces life expectancy by ten years [Whitlock G, *et al.* ; 2009] .

The mean BMI (Kg/M^2) was 29.81 (Table 1). The majority of persons studied were obese (59%) BMI($>30 \text{ kg/m}^2$) with a pre-obese (BMI 25-29.9 kg/m^2) of about (22%) which is high percent (figure 3) compared to a study in Iran showed obesity, body mass index $> \text{or} = 27 \text{ kg/m}^2$ was present in males (24.5%) and females (30.2%) [ZN Hatmi;2007]. The prevalence of overweight and obesity in the Kingdom of Saudi Arabia , United Arab Emirate, Egypt, and Bahrain ranges from 74% to 86% in women and 69% to 77% in men. These data indicate a much higher prevalence of obesity among adult women, while overweight is more marked among adult men [Davidson;2010; Harrison;2007] .

which is close to our study if we collect both the pre-obesity and obesity will be (71%) (figure 3). This result was consistent with data collected by WHO in Iraq in 2005 found overweight and obesity were (50.8%) and (16.8%) respectively of about (67.6%) which is near to our study [Khawla HY;2012].

The majority of sample where in pre-hypertension was (35%), (systolic BP=139.7±21.98) which is very close to United States of America(USA) which means BP (systolic between 120-139 mmHg and diastolic between 80-89 mmHg) (Table 1, and Figure 2) Data from the 1999 and 2000 National Health and Nutrition Examination Survey (NHANES III) estimated that the prevalence of prehypertension among adults in the United States was approximately 31%. According to some studies, prehypertension can increase the risk for heart attacks, strokes, congestive heart failure, and renal failure [Qureshi AI;2005, Vasan, *et al.* ; 2001].

One study found that a pre-hypertensive person is more than three times more likely to have a heart attack and 1.7 times more likely to have heart disease than a person with normal blood pressure [American Heart Association ;2005,], and also we found that hypertension stage I and II were (30%,28%) respectively where with blood pressure above (140 mmHg) systolic and diastolic above (90mmHg) (figure 2). The World Health Organization rates hypertension as one of the most important causes of premature death worldwide and the problem is growing.

A similar study done in Al-Khobar city in Kingdom Saudi Arabia showed that among male students 18 years and older, 13% had systolic and 8.4% had diastolic hypertension [Amr A Sabra,*etal*,2007] ,which is a little lower than our numbers may be due to the age of the persons studied in their study where they took small age groups, while Iran study the prevalence of hypertension were (13.7%) systolic blood pressure (> 140 mmHg) , and (9.1%) diastolic blood pressure (> 90 mmHg) [ZN Hatmi;2007] .

This study shows high frequency distribution of most of risk factors in the sample like physical inactivity (86%) hypertension (58%) , obesity (59%) , diabetes mellitus (29%) (Table 2) which are if compared to Iran as follows :(6.3%) were diabetic, ,(13.7%) systolic blood pressure > 140 mmHg,(9.1%) diastolic blood pressure > 90 mmHg and (87%)of them were physically inactive [ZN Hatmi , *etal*,2007].The results are close to our study except the hypertension, and The smoking habits was (22%) (Table 2). Centers for Disease Control and Prevention, 2004 provide there is a strong consistent and dose linked relationship between cigarette smoking and ischemic heart disease, especially in younger age individuals. Tobacco use, whether it is smoking or chewing tobacco, increases risks of cardiovascular disease. Smoking is estimated to increase the risk of—Coronary heart disease by 2 to 4 times .

There was significant association of physical inactivity (86%) with the development of CHD (Table 2 , Figure 6) (p-value 0.009^aby Fischer —exact test) all of persons of high risk presented with sedentary lifestyle , physical inactivity roughly doubles the risk of coronary heart disease and is a major risk factor , physical activity has a protective effect which may be related to increased serum HDL cholesterol concentrations, lower BP, and collateral vessel development A sedentary lifestyle is a type of lifestyle with no or irregular physical activity, Studies showed that doing more than 150 minutes (2 hours and 30 minutes) of moderate physical activity or an hour of vigorous physical activity (non- mechanical agricultural work or swimming 2 hours daily) every week will reduce the risk of coronary heart disease by about 30% .Even if have existing risk factors for cardiovascular disease, if keep active the evidence suggests that this may lower risk of premature death compared to inactive people with no risk factors for cardiovascular disease [Khawla ,2012] , and another studies in KSA

showed that that a high proportion of university and secondary school students spent (≥ 14 hours) per week in TV watching and computer usage were (37.7% and 46.5%, respectively) [Amr A Sabra, Attia Z. Taha;2007].

The study also shows there is no significant association between the residence and the 10 years risk of developing CHD ($\chi^2=2.91$, $df=3$, $P=0.405$), since the high risk scores who live in urban (58%) as compared to (42%) live in the rural area (figure 4).

There was no significant association between the 10 year risk of CHD development and family history of CHD (figure 5, table 4) this is may be due to the fact that these studied persons are now free of CHD. The very low risk scores who have family history of CHD were (44%) and absence of family history of CHD were (56%) in same group, compared with those with high risk scores of same family history were (32%) and (68%) respectively. If a first-degree male relative (e.g. father, brother) has suffered a heart attack before the age of (55) years, or if a first-degree female relative has suffered one before the age of (65) years, they are at greater risk of developing heart disease. If both parents have suffered from heart disease before the age of (55) years, the risk of developing heart disease can rise to 50% compared to the general population.

There was no significant association to alcohol intake ($p\text{-value} = 0.564^a$) between the studied group, where they are (93%) not alcoholic, no significant association to occupation (majority of the high risk group were not employed (71%) (house-wives, self-employed, retired) ($p\text{-value} = 0.139$) and no significant association between residence and the 10 years risk of CHD development (Table 4). Residents of disadvantaged neighborhoods had a higher risk of disease than residents of advantaged neighborhoods, even after we controlled for personal income, education, and occupation [Ana V. Diez Roux, 2001]. Moderate alcohol intake is associated with health benefits, including less cardiovascular disease, diabetes, hypertension, and lower all-cause mortality [O'Keefe, *etal*; 2007]. Excess alcohol consumption is associated with hypertension and cerebrovascular disease. Alcohol increases HDL cholesterol and reduces thrombotic risk. The World Health Report in 2002 estimated that 2% of CHD in men in developed countries is due to excessive alcohol consumption [Guilbert; 2007].

The study shows no significant association between coronary heart disease risk and triglyceride, LDL and VLDL with ($p\text{-value}=0.747$, $p\text{-value}=0.838$, $p\text{-value}=0.564^a$) respectively. The high risk group have high triglyceride (TG) level ($>2.26\text{mmol/l}$) was (26%) ($\chi^2=0.582$, $df=2$), same for LDL the high level (4.1mmol/l and above) for it in the high risk score group was (19%) ($\chi^2=0.354$, $df=2$), while the VLDL in the high level ($>0.645\text{mmol/l}$) in the high risk score group was (7%) (Table 5), this disagree with other study done in Yemen study also found about (66%) of population have hyper triglycerideamia [John, *etal*; 2008], may be due to that fact these persons are not diseased by CHD till the time of study done. High levels of triglyceride combined with high levels of LDL cholesterol speed up atherosclerosis increasing the risk for heart attack and stroke. It is very important to keep LDL levels low, because high levels of LDL indicate that there is much more cholesterol in the blood stream than necessary, therefore increasing the risk of heart disease [Toth, Peter; 2005]. Those with higher levels of HDL-C tend to have fewer problems with cardiovascular diseases, while those with low HDL-cholesterol levels (HDL-C) (especially less than 40mg/dL or about 1mmol/L) have increased rates for heart disease [Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults; 2001]. High-density lipoprotein (HDL) is positively associated with a decreased risk of coronary heart

disease (CHD). As defined by the US National Cholesterol Education Program Adult Treatment Panel III guidelines, an HDL cholesterol level (HDL-C) of 60 mg/dL or greater is a negative (protective) risk factor [Mora S, Buring JE, 2007], on the other hand, a high-risk HDL cholesterol level is described as one that is below 40 mg/dL. Randomized, controlled clinical trials have demonstrated that interventions to raise HDL cholesterol levels are associated with reduced CHD events. A prospective analysis by Mora *et al.* investigated the link between cholesterol and cardiovascular events in women and found baseline HDL-C level was consistently and inversely associated with incident coronary and coronary vascular disease events across a range of low-density lipoprotein-cholesterol (LDL-C) values [Mora, *etal*, 2011].

In this study there was a significant association between the 10 years risk of developing CHD and BMI (Table 6), where (68%) of patients with high risk group were pre-obese and obese while the normal BMI in the high risk score group were (32%), the not high risk score pre-obese and obese group were (84 %) and the normal BMI in the not high risk group were (16%) (p-value = 0.041) (Table 6). There was significant association between the 10 years risk of development of coronary heart disease and the waist/hip ratio (p-value = 0.013^a), the high risk score were (20.6%) their mean $\pm$ SD of WHR were (0.96 $\pm$ 0.066), while the (not high risk score) group were (79.4%), their mean $\pm$ SD of WHR were (0.92 $\pm$ 0.064), (t-test = 2.52), (p-value = 0.013^a), this agrees with many studies like Indian study where found Obesity, body mass index $\geq$ 27 kg/m² was present in (135 males) about (24.5%) and (173 females) (30.2%), while truncal obesity (waist:hip $>$ 0.9 males, $>$ 0.8 females) was found in (316) males (57.4%) and (392) females (68.4%) [Gupta, *etal.*, 2002].

Conclusions:

- This study provides comprehensive and alarming data about the high percentage of many traditional risk factors of CHD, which are modifiable (preventable).
- The prevalence of standard CHD risk factors like physical inactivity was (86%) which is very high that requires specific attention and encourage certain types of sports that are easy to be practiced by all community.
- Low HDL-cholesterol (71%), high levels of LDL (23%) and high triglycerides levels (21%), high percent of obesity (59%) and pre-obesity (22%), hypertension (58%), diabetes mellitus (29%) which requires specific lifestyle modification by the persons involved like decreasing saturated fat and increase fruits and vegetables and decrease salt intake in food.
- A public health program should be considered when planning strategies aimed at preventing or reducing the incidence of CHD in our society.
- Persons with family history of CHD should check their lipid profile and observe their blood pressure periodically.

Recommendations:

1. The results of this study have to be further assessed using a more elaborate analytical study and enrolling a bigger sample size.
2. The high proportion of risk factors mandates the conduct of community based surveys for early recognition and prevention of CHD and associated risk factors and to reduce the impact of CHD on the community.
3. As CHD is considered a global health problem and because hypertension and obesity along with physical inactivity were the main preventable risk factors, the nutrition and health promotion programs should be encouraged to promote healthy life style and to improve the awareness of population and mainly health workers about

nutrition and healthy eating habits and to reduce the tendency to overweight and obesity.

4. motivation of patients to adhere to risk-reduction therapies.

5. modification of intensity of risk-reduction efforts based on the total risk estimate.

6. This is may be the first study about the risk assessment of CHD in Babylon; its results provide valuable information on the risk factors of CHD in such high risk group and should encourage researchers to investigate more such an emerging, health problem.

7. An urgent need for intervention programs to raise the health awareness and knowledge of children and adolescents about risk factors for heart disease and encourage them to adopt a healthy dietary behavior, promote physical exercise and smoking cessation.

8. Screening for CHD risk factors should be performed by PHC physicians during their routine daily activity. This is best achieved by integrating CHD prevention and control program within the current PHC services.

Table 1: Mean $\pm$ SD of study variables of all study population

Variable	Mean $\pm$SD
Age	49.64 $\pm$ 11.11
Systolic blood pressure	139.7 $\pm$ 21.98
Diastolic blood pressure	87.21 $\pm$ 11.29
BMI (Kg/m²)	29.81 $\pm$ 5.13
WHR	0.93$\pm$ 0.06
Total cholesterol (mmol/l)	4.66 $\pm$ 1.04
LDL (mmol/l)	3.33 $\pm$ 0.99
Framingham risk score	7.30 $\pm$ 5.65

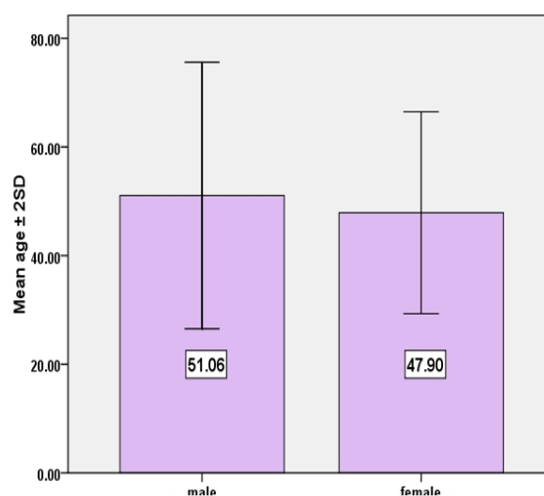


Figure 1: Mean difference of age of study population by sex

Table 2 : Distribution of study population by study variables

Variable	Number	%
Smoking habit	33	22%
Alcohol intake	7	5%
Diabetes	43	29%
Physical inactivity	129	86%
Hypertension	88	58%
Obese (BMI>30)	88	59%
High triglyceride	32	21%
High cholesterol	9	6%
High LDL	35	23%
High VLDL	7	5%
Low HDL	106	71%

* High triglyceride level (2.26 mmol/l and above), high cholesterol level (above 6.2 mmol/l) high LDL level (4.1mmol/l and above), high VLDL (above 0.645mmol/l) and low HDL (<1 in male and <1.3 in female).

Table 3 : Distribution of study population by 10 years risk of coronary heart disease events (coronary death, Myocardial infarction and angina).

10 years risk of coronary heart disease event	N	%
Very low risk	70	47%
Low risk	21	14%
Moderate risk	28	18%
High risk	31	21%
Total	150	100%

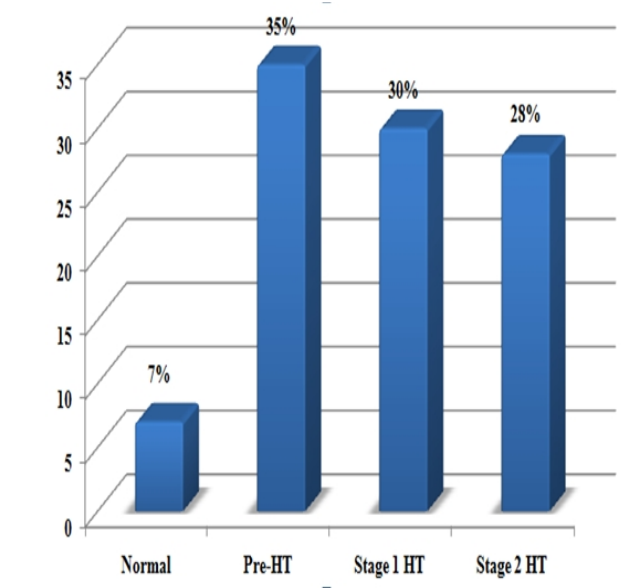


Figure 2: Distribution of study population by blood pressure

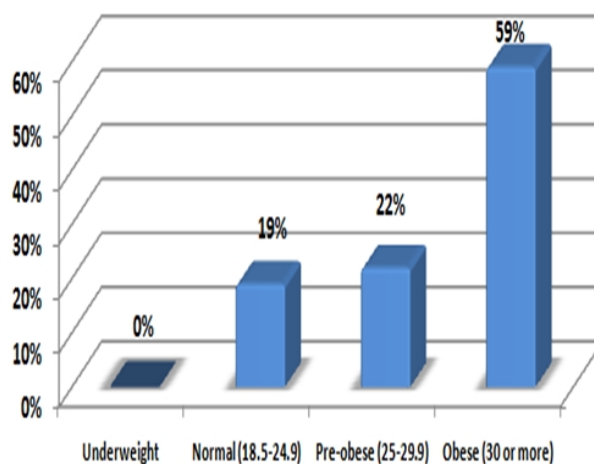


Figure 3: Distribution of study population by BMI

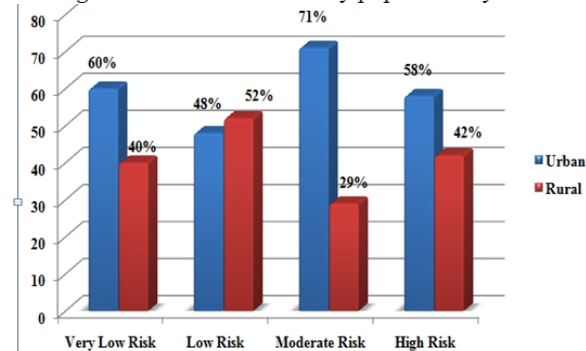


Figure 4: Association of 10 years risk of coronary heart disease event residence

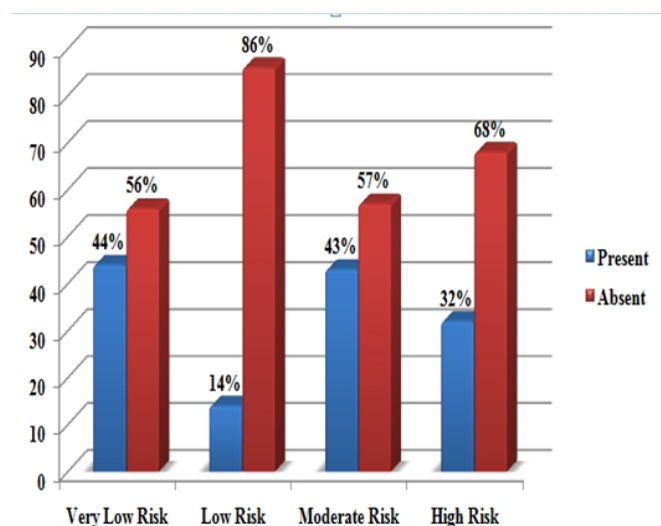


Figure 5: Association of 10 years risk of coronary heart disease event by family history

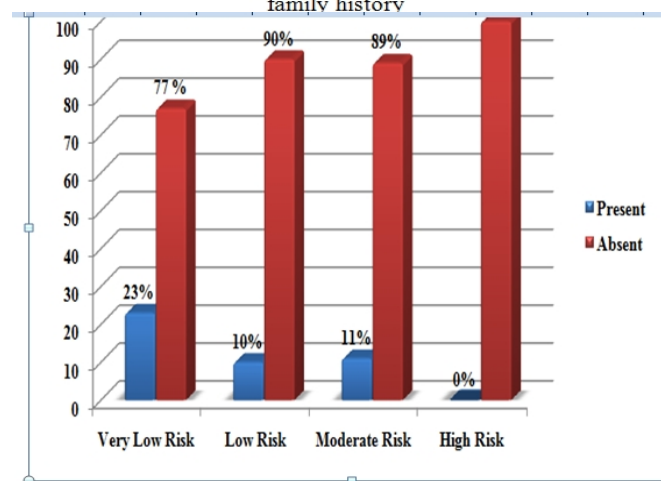


Figure 6: Association of 10 years risk of coronary heart disease event by physical activity

Table (4): The association of 10 years risk of coronary heart disease with study variables

Variable	High risk	Moderate risk	Very low and low risk	χ^2	df	P-value
Residence						
Urban	18 (58%)	20 (71%)	52 (57%)	1.882	2	0.390
Rural	13 (42%)	8 (29%)	39 (43%)			
Occupation						
Employee	9 (29%)	13 (46%)	45 (49%)	3.944	2	0.139
Not employed	22 (71%)	15 (54%)	46(51%)			
Family history of coronary heart disease						
Present	10 (32%)	12 (43%)	34 (37%)	0.707	2	0.702
Absent	21 (68%)	16 (57%)	57 (63%)			
History of alcohol intake						
Present	2 (7%)	2 (7%)	3 (3%)			0.564 ^a
Absent	29 (93%)	26 (93%)	88 (97%)			
Physical activity						
Absent	31 (100%)	25 (89%)	73 (80%)			0.009*** ^a
Present	0 (0%)	3 (11%)	18 (20%)			

*p value ≤ 0.05 was significant**p value ≤ 0.01 was significant

a : Fisher – exact test .

Table (5): The association of 10 years risk of coronary heart disease by triglyceride , LDL and VLDL

Variable	High risk	Moderate risk	Very low and low risk	χ^2	df	P-value
Triglyceride						
High (2.26 mmol/l and above).	8 (26%)	5 (18%)	19 (21%)	0.582	2	0.747
Normal and slightly above normal	23 (74%)	23 (82%)	72 (79%)			
LDL						
High (4.1 mmol/l and above).	6 (19%)	7 (25%)	22 (24%)	0.354	2	0.838
Optimal, near optimal and borderline	25 (81%)	21 (75%)	69 (76%)			
VLDL						
High (>0.645 mmol/l).	2 (7%)	2 (7%)	3 (3%)			0.564 ^a
Normal and low	29 (93%)	26 (93%)	88 (97%)			

a: Fisher –exact test

Table (6): The association of 10 years risk of coronary heart disease by body mass index

Variable	High risk	Not high risk	Total	χ^2	df	P-value
Body mass index						
Pre-obese and obese	21 (68%)	100 (84%)	121 (81%)	4.186	1	0.041*
Normal	10 (32%)	19 (16%)	29 (19%)			
Total	31 (100%)	119 (100%)	150 (100%)			

*p value ≤ 0.05 was significant

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