Cardiovascular Risk Factors among College Students

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Background: Cardiovascular diseases (CVD) are the leading causes of death worldwide. Their incidence particularly coronary heart diseases (CHD) are increasing among young adult. Few data exist on the prevalence of risk factors in young adult college students.

Aim: To determine the prevalence of CVD risk factors among young adult college students.

Method: Two Hundred and thirty-two questionnaires covering socio-economic aspects, physical activity, diet, smoking, personality, and parental history of CHD death were reviewed. In addition, clinical examination, biochemical analysis of lipid profile were done.

Result: All were students asymptomatic for CVD, 36 (15.5%) were smokers, 92 (39.6%) consumed mostly fatty diet, 17 (7.3%) were obese. 22 (9.5%) were physically inactive, 24 (10.3%) had positive parental history of CHD death, 49 (21.1%) had type A personality, 5 (2.2%) had diabetes mellitus, 13 (5.6%) had systolic blood pressure $\geq$ 140 mmHg, and 20 (8.6%) had diastolic blood pressure $\geq$ 90 mmHg. The prevalence of smoking and physical inactivity was significantly higher among men than women. While obesity and parental history of CHD death were significantly more prevalent among older age group ($\geq$ 30years) than in younger age group (<30 years). High serum cholesterol level was prevalent in 17 (7.3%), low level of HDL-C in12 (5.2%), high levels of LDL-C in 11 (4.7%), and high triglycerides level in5 (2.2). Low level of apo A was prevalent in 28 (16.2%) of men and 9 (15.3%) of women, while high level of apo B was prevalent in 12 (6.9%) of men compared to 2 (3.4%) of women. The prevalence of abnormal levels of HDL-C, TC/DL and LDL/HDL ratios were significantly higher among older age group (≥30years) than in younger subjects (<30 years). No significant difference in the prevalence of lipid risk factors was noted between men and women.

Conclusion: Many CVD risk factors were prevalent among apparently healthy young college students. Those young adult people may be more at risk from subsequent CVD than was expected.

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Cardiovascular diseases (CVD) are the leading causes of illness and death worldwide[1]. The rapid changes in lifestyle have led to an increase in the magnitude of CVD, which are emerging as a predominant health problem especially in developing countries, where the non-communicable diseases are replacing the traditional enemies of infectious diseases and malnutrition[1]. The so-called epidemiological transition is already much further advanced in many countries in the Mediterranean region[2].

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Many risk factors can help predict the likelihood of CVD: heredity, Male gender, advancing age, cigarette smoking, high blood pressure, diabetes mellitus, obesity, lack of physical activity, dyslipidemia and homocysteine level. The more risk factors a person has, the greater the likelihood of developing heart diseases[3].

The concept of risk factors identification and modification is based on the idea that, exposure environmental factors increases the statistical risk for developing a disease and alteration of these factors should postpone or prevent the disease. Identification of risk factors operating in young age is important since correction of modifiable risk factors was found to be more yielding in this age group than in older patients[4].

Though numerous studies have examined the CVD risk factors in young adult population in Iraq, in most of these studies the emphasis was mainly related to clinical cases[5-7]. No study had examined the CVD risk in young adult college students asymptmatic for CVD.To give a proxy profile on the CVD risk status among such people the present study was conducted.

The aim of this study is to determine the prevalence of CVD risk factors among young adult college students.

METHOD

The study population

The study is a cross sectional carried out in December 2000. It included a sample of students (both undergraduate and postgraduate) of three colleges from the university of Basrah chosen randomly. Two Hundred and thirty-two young adult people had been included in the study. Each person was interviewed, physically examined and subjected to full lipid biochemical analysis.

The studied variables

The data on each participant covered the following areas:

a. Socio-demographic characteristics, medical history, family history of CVD, smoking habits, physical activity and aspects of dietary habits.

b. Anthropometric measures

Standing height without shoes was measured to the nearest 0.5 cm using a stadiometer attached to the weighing scale. Body weight was measured with light clothes as possible on a calibrated scale to the nearest 0.5 Kg. BMI was then calculated using Quetlet index (Weight Kg / Height M^2) to find out the obesity among participants[8].

c. Physical examination

Blood pressure was measured in a sitting position. Two measurements were taken and the value that was used, was the mean blood pressure. Heart auscultation and pulse rate measurements were done to detect any heart abnormality.

d. Biochemical measurements

All participants were requested to fast for 12 hours before blood samples were drawn. Blood samples were taken as early as possible (8-9 AM) into plain tubes and the blood was examined either immediately or within 2 hours for determination of total cholesterol, triglycerides, LDL, HDL, blood glucose, Apo A and Apo B lipoproteins.

Definition of risk factors

1. Hypercholestrolemia: total serum Cholesterol >200 mg/dl.

2. Low serum HDL : < 40 mg / dl

3. High serum LDL : > 130 mg / dl

4. High serum Triglycerides: > 200 mg/dl

5. TC/HDL: >4.6, LDL/HDL: >3 [9] low Apo A (Male < 1.14 gm/l and women < 1.23gm/l). Apo B(Men >1.14 gm/l and women >1.31gm/l)[10]

6. Hypertension: systolic BP $\geq$140mm Hg
   Diastolic BP $\geq$90mm Hg [11]

7. Diabetes mellitus: history of D, M or FBS >126mg/dl [12]

8. BMI: Non obese: BMI <25kg/m^2
   Overweight: BMI 25-29.9 kg/ m^2
   Obese: BMI $\geq$30 kg/ m^2 [13].

9. Physical activity: a combined index for leisure time physical activity was calculated from the product of intensity, estimated duration and monthly frequency using the method reported by Raitakar et al[14]. The range of index is 1-225. Subjects with index of higher or equal to 85 were considered as a constantly active, which nearly equal to an intense physical activity for more than two hours/week. Subjects with an index value of less than or equal to 15 were considered as constantly sedentary which nearly equals to one hour of light aerobic activity/ week. Those who have an index of 16-84 are considered moderately active[14].

10. Smoking:

    Non-smokers: those who never smoke.
    Current smokers included those who smoke regularly.
    Former smokers included those who stopped smoking for more than three months.

11. Parental history of CHD death: positive if presence of history of one or both parents death due to CHD.

12. Type A personality: a self-reported personality questionnaire modified from Friedman and Rosenmann was used. It was composed of 18 questions divided on six criteria (three for each). Having two positive answers for each criterion renders that criterion positive, and having five out of six criteria denotes that the person has type A personality[15].

Statistical analysis

Descriptive data were expressed as means ±SD values. Chi-Square or Fisher Exact tests were used -where applicable- to assess the significance of prevalence differences between subgroups. t-test was used to compare the means of two independent groups, and ANOVA to compare he means of more than two independent groups. P-value <0.05 was considered significant.

RESULT

One Hundred and seventy-three (74.6%) were men, while women formed 59 (25.4%). The mean age was 24.8±5.2 years for the total population and 24.4±4.3 years for men and 25.9±7.1 years for women without a significant difference.

Table-1 shows the means and standard deviations of the vital and anthropometeric measurements of the study groups Weight and height were significantly different between men and women, but no significant differences were noted between men and women regarding body mass index, systolic blood pressure and diastolic blood pressure.

Table-1 Mean ±SD of the vital & anthropometric measurements of the study population (Total & according to age and sex)

	Mean ±SD				
	Weight (Kg)	Height (cm)	BMI (Kg/m²)	SBP (mmHg)	DBP (mmHg)
Total popul. (n=232)	67.4±13.4	169.3±8.1	23.4±3.9	117.7±10.6	76.7±7.5
Sex					
Men (n=173)	70.4±12.9	172.6±5.9	23.6±3.9	118.1±10.4	76.9±7.1
Women(n=59)	58.8±10.9	159.7±5.6	22.9±3.9	116.6±11.3	75.9±8.5
P-value	<0.001	<0.001	NS	NS	NS
Age					
< 30y (n=201)	66.4±13.2	169.8±7.9	22.9±3.8	117.8±10.3	76.2±7.5
≥ 30y (n=31)	74.1±12.7	166.3±8.7	26.6±3.4	117.3±11.4	79.8±6.9
P-value	<0.001	<0.05	<0.001	NS	<0.05

BMI= Body mass index, SBP= Systolic blood pressure, DBP= Diastolic blood pressure

The mean values of lipid parameters are represented in Table-2. They were within normal limits. They were higher in subjects aged ≥30 years than in those <30 years of age with significant differences. (except LDL and Apo A). While no significant differences were noted regarding sex except for serum triglycerides and Apo A which were significantly different between men and women, with desirable levels in women than men for most of the lipid parameters.

Table-2 Mean± SD of the lipid parameters of the study population (Total & according to age and sex)

	Mean ± SD						
	Total popul. n=232	**Age**		**P-val.**	**Sex**		**P-val.**
		< 30years n=201	≥ 30years n=31		Men n=173	Women n=59	
TC.	150.1±32	148.9±31.1	157.4±37.4	NS	149.8±29.9	150.8±37.8	NS
HDL	60.3±13	61.7±12.2	51.6±14.7	<0.001	59.7±13	62.3±12.8	NS
LDL	71.3±31	69.9±30.6	80.3±32.7	NS	70.9±30.5	72.3±32.7	NS
TC/HDL	2.61±0.92	2.51±0.8	3.29±1.31	<0.001	2.66±0.98	2.48±0.72	NS
LDL/HDL	1.28±0.74	1.21±0.69	1.74±0.87	<0.001	1.31±0.78	1.22±0.59	NS
S.TG	90.7±41.7	85.2±35.3	125.9±59.9	<0.001	95.1±44.1	77.7±30.7	<0.001
Apo A	1.41±0.29	1.42±0.29	1.39±0.26	NS	1.38±0.27	1.51±0.32	<0.001
Apo B	0.97±0.29	0.96±0.28	1.08±0.32	<0.05	0.98±0.31	0.96±0.22	NS

TC= Total cholesterol, HDL= High density lipoprotein. LDL= Low density lipoprotein, S.TG= Serum Triglycerides, Apo A= Apolipoprotien A, Apo B= Apoplipoprotein B.

Non-lipid risk profile

As shown in Table-3, all the non-lipid risk factors that were inquired about, were prevalent in the study population to a different extent. The more prevalent risk factors were fatty diet consumption (39.6%), type A personality (21.1%) and smoking (15.5%). The least prevalent risk factors were SBP ≥ 140mmHg (5.6%) and diabetes mellitus (2.2%).

Obesity, physical inactivity, parental history of CHD death were more prevalent in older age group (≥30years) than in younger age group (< 30years). While smoking, fatty diet consumption, and type A personality were more prevalent in younger age group than in older subjects.

Of men, 36 (20.8%) were smokers while none of the women had reported smoking. Women showed a higher prevalence of fatty diet consumption, physical inactivity, type A personality , and high diastolic blood pressure than men.

Table-3 Prevalence of non-lipid risk factors among the study population (Total population & according to age and sex)

Non-lipid risk factor	**Prevalence of risk factors (%)**						
	Total pop. n=232	**Age**		P-val.	Sex		P-val.
		< 30years n=201	≥ 30years n=31		Men n=173	Women n=59	
Smoking	15.5	15.9	12.9	NS	20.8	0	<0.001
Fatty diet	39.6	28.3	12.9	NS	38.2	42.4	NS
Obesity	7.3	6	16.1	<0.001	8.1	5.1	NS
Phy.inactiv.	9.5	8.5	16.1	NS	6.9	16.9	<0.001
Par.H.dea.	10.3	7	32.3	<0.001	11	8.5	NS
Type A per.	21.1	22.9	9.7	NS	19.7	25.4	NS
DM	2.2%	2	3.2	NS	1.2	5.1	NS
SBP ≥ 140	5.6	5	9.7	NS	5.8	5.1	NS

DBP ≥ 90	8.6	8	12.9	NS	7.5	11.9	NS

Phy.inactiv.= physical inactivity, Par.H.dea.= parental history of CHD death, DM= Diabetes Mellitus, Type A per.= Type A personality

Lipid risk profile

High serum cholesterol level, low level of HDL, high levels of LDL and serum triglycerides were prevalent in 17 (7.3%), 12 (5.2%), 11 (4.7%), and 5 (2.2%) of the study population respectively (Table-4). Low level of apo A was prevalent in 28 (16.2%) of men and in 9 (15.3%) of women, while high level of apo B was prevalent in 12 (6.9%) of men compared to 2 (3.4%) of women.

Older subjects showed significantly higher prevalence of low HDL level, high TC/HDL and LDL/HDL ratios than their younger counterparts. No significant differences in the prevalence of all lipid parameters were found between men and women (Table-4)

Table-4 Prevalence of lipid risk factors among the study population (Total population & according to age and sex)

lipid risk factor	Prevalence of risk factors (%)						
	Total pop. n=232	Age		P-val.	Sex		P-val.
		< 30y n=201	≥ 30y n=31		Men n=173	Women n=59	
TC	7.3	7	9.7	NS	6.4	10.2	NS
HDL	5.2	3.5	16.1	<0.01	5.2	5.1	NS
LDL	4.7	4.5	6.5	NS	4.6	5.1	NS
TC/HDL	3.4	2	12.9	<0.01	4.6	0	NS
LDL/HDL	3	2	9.7	<0.05	4	0	NS
S.TG	2.2	1.5	6.5	NS	2.9	0	NS
Apo A Male	16.2	15.5	22.2	NS	16.2	15.3	NS
Female	15.3	13	23.1	NS	-	-	-
ApoB Male	6.9	5.2	22.2	<0.01	6.9	3.4	NS
Female	3.4	2.2	7.7	NS	-	-	-

TC= Total cholesterol, HDL= High density lipoprotein. LDL= Low density lipoprotein, S.TG= Serum Triglycerides, Apo A= Apolipoprotien A, Apo B= Apoplipoprotein B.

DISCUSSION

The sample size to achieve enough power was the main obstacle. The financial costs of the biochemical analysis prevented the expansion of the sample beyond what had already been achieved in this study.

The prevalence of smoking among college students in this study was (15.5%). It was lower than that reported by Jamil et al (39.9%) among students of eight colleges, University of Baghdad[16]. It was also lower than that reported by Al-Taha, who found that the prevalence rate of smoking among medical students in University of Basrah in 1992 was 22.1%[17]. The prevalence of smoking among women participants was 0%. It was lower than that reported by other studies in Iraq[17,18].

Although the prevalence of obesity reported in this study (7.3%) was higher than that reported in European countries, where the prevalence of overweight and obesity were

8% and 1% respectively, and among the medical student of Greece University, the prevalence of obesity was 4.3%[19-20]. It was lower than that reported in some Arab Gulf countries. For example, among Kuwaiti College students, overweight and obesity were prevalent as 38.5% and 11% respectively [21].

The prevalence of sedentary living habits was low (9.5%). According to the WHO report (1999), 60% of the world population was not active [22].

This study showed that many people consumed fatty diet (34.3%). Such a proportion may reflect the nature of Iraqi diet, which is mainly composed of fried food, butter, cream, red meat, cheese, eggs, and using solid margarine instead of oil in cooking.
The mean values of the lipid and lipoprotein parameters obtained in this study were generally lower than that reported by other studies, whether in Iraq or abroad [23-27].

Another finding in this study was the low prevalence of some lipid risk factors in comparison with some Arab and Western countries [25,26,27,28]. The most prevalent lipid risk factor was the low level of Apo A, it seems that Apo A is mostly affected by smoking and male gender, since 15.5% of the studied subjects were smokers, and 74.6% were men.

CONCLUSION

A high prevalence of some cardiovascular risk factors in Basrah College students was observed. The prevalence of lipid risk factors was found to be mostly affected by age rather than by sex.

The alarming prevalence of risk factors in such young population demonstrates the need for organized efforts for the implementation of local and national–level programs to prevent cardiovascular diseases.

REFERENCES

1. WHO. World Health Report 2003, Chapter 1: Global Health: today's challenges. http://www.who.int/entity/whr/2003/chapter1/en.html
2. Alwan A. Non-communicable diseases a major challenges to the public health in the region. Eastern Mediterranean Health J 1997; 3(1): 6-16.
3. Barrett S. Risk factors for CVD. www.quackwatch.org/03 Health promotion/cardiorisk.html. [Internet] accessed in 20/12/2002.
4. Pasternak RC, Abrams J, Greenland P, et al. Identification of CHD risk: is there a detection gap? 34th Bethesda conference. Task Force 1. J Amer Coll Cardiol 2003: 41(11): 1855-917.
5. Al-Hadad FH. Myocardial infarction in young Iraqi patients, changes of trends of risk factors and complications over the past decade. J Fac Med Bagh 1989,31: 2 5-31.
6. Al-Kaubaisy OK, Mahdi RS, Al-Nooh MS. Risk factors in young male Iraqi patients with acute myocardial infarction. J Comm Med 1992; 5: 11-24.
7. Yassen YO. Ischaemic heart diseases and related risk factors in Missan Province. Med J Basrah University 2005;23(2): 40-44.
8. Frier BM, Truswell AS, Shepherd J, et al. Nutritional factors in health and disease. In: HaslettC, Chillver ER, Hunter TA& Boon NA(Eds); Davidson's principles and practice of Medicine, 18th ed, Churchill living stone, London,2001.

9. The full report of the National Cholesterol Education Program (NCEP), Adult Treatment Panel III (ATP III). Available from http://www.nhlbi.nih.gov [Internet]. Accessed in 20/3/2003.
10. Patel ST, Newman HA. Apolipoproteins. *In* Pesce AJ, Kaplan LA (Ed): Methods in clinical chemistry. USA, 1987:1145-50.
11. Chobanian AV, Bakris GL, Black HB, et al. The 7th report of the Joint National Committee on Prevention, Detection, and Treatment of high blood pressure. JAMA 2003; 289(9): 2560-72.
12. Frier BM, Truswell AS, Shepherd J, et al. Diabetes Mellitus. *In* Haslett CH, Chillvers FR, Hunter JA,et al (Ed): Davidson's principles and practice of medicine. 18th Ed, Churchill Livingstone, London, 2000: 480.
13. WHO: Obesity. preventing and managing the global epidemic. Technical reports series 894, WHO, Geneva, Switzerland, 2000.
14. Raitakari OT, Porka KVK, Taimela S, et al. Effects of persistent physical activity and inactivity on coronary risk factors in children and young adults. Amer J Epidem 1994; 140(3): 195-205.
15. Friedman M, Rosenmann RH, Carro V. Changes in serum cholesterol and blood clotting time in men subjected to cycle variation of occupational stress. Circulation 1980;17:85.
16. Jamil H, Haboubi G, Mukhlis GM, et al. Epidemiological aspects of smoking habit among first and fourth grade male students at eight colleges, University of Baghdad. Iraqi J Comm Med 1989; 2(2): 125-130.
17. Al-Taha MA. Smoking habits among medical students in Basrah University. Iraqi J Comm Med 1994;7(2): 231-7.
18. Jamil H, Mukhlis GM, Jamil LH. Epidemiological study on smoking habit among females in Baghdad city. Iraqi J Comm Med 1992; 5(1): 3-10.
19. Bellisle F, Monneuse MO, Steptoe A, et al. Weight concerns and eating pattern: A survey of University students in Europe. Inter J Obes 1995; 19: 723-30.
20. Bertsias G, Mammas I, Linardakis M, et al. Overweight and obesity in relation to CVD risk factors among medical students in Crete University, Greece. BMC Public Health 2003; 3: 3-11.
21. Al-Isa AN. Dietary and socioeconomic factors associated with obesity among Kuwaiti college men. Br J Nutrition 1999; 82: 369-74.
22. World Health Organization (WHO). Active living-The challenge ahead: Developing active living policies and programs in over 50 countries by the end 2001. Geneva, 1999.
23. Al-Essa RJ, Sharma PK, Kadhum SHJ, et al. Serum total lipids and cholestreol in Iraqi individuals of Kufa. Iraqi Med J 1982; 29,30: 16-20.
24. Ajlaan SK. Lipid profile and physical activity. J Bahrain Medical society 2004; 16(4): 186-191.
25. Al-Shagrawi RA. Selected risk factors for CVD among Saudi men. Bahrain Med Bull 1998; 20(3): 106-10.
26. Karadsheh M, Sweq A, Akasheh M, et al. Plasma lipid profile in the male population of Jordanian armed forces. Bahrain Med Bull 1996; 18(3): 89-91.
27. Law M. Lipids and CVD.*In* Yusuf S, CairusJA, Camm AJ, et al(ed): Evidence based cardiology .BMJ books, BMA House, London, 1998: 191-205.
28. Osman AK, Al-Nozha MM. Risk factors of CAD in different regions of Saudi Arabia. East Medit Health J 2000;6(213): 465-74.