

Cardiovascular Risk Factors and its Knowledge among High School Students in Erbil City: a cross-sectional survey

Khanzad Hadi Rashid, Sadiya Abdulla Mawlud, Amanj Zrar Hasan, Salar Saady

Abstract- Objective: The major aim of this study is to assess the existence of cardiovascular disease risk factors (CVD) among secondary school students in Erbil City.

Methods: a descriptive cross-sectional study was conducted among 400 high school students, 153 boys and 247 girls aged between 14-17 years old from 8 randomly selected governmental high schools. Questionnaire survey and laboratory tests were used to assess cardiovascular risk factors such as; smoking and first relative degree medical history. BMI and blood pressure measurements were also concerned.

Results: generally the number of relevant risk factors (RF) of the CVD was discussed. The number of Students who having one RF were 124 (31%), 62 (15.5%) those with two RF and among 400 students 197 (49.25%) were without RF. The obesity 20 (7.9%) and high blood pressure 48 (18.9%) is more common among females. Generally the percentages of lipid profile (Tc, TG, LDL, HDL) and random blood sugar were higher among males 10 (6.8%), 23 (9%), 21 (8.3%), 17 (11.6%), and 17 (11.6%) than female. Rheumatoid arthritis (RA) was among the related RF to CVD, RA among males higher 24 (16%) than females 22 (8.7%). The family history RF among students generally was 90 (22.5%).

Conclusions: CVD risk factors are clearly predominant among students of secondary school in Erbil. This study suggests an urgent need to improve and raise awareness about student's knowledge on the sound of nutrition, and the relation of these RF with diet and obesity. Health screening strategies require to control the burden related risk factors RA should also be considered as a high-risk condition for CVD, the researcher emphasizing the need for CVD risk management in person with RA, high glucose, high blood pressure and in those with smoker habits.

Index Terms- CVD, lipid profile, blood pressure, Rheumatoid arthritis, and smoking habits.

I. INTRODUCTION

Cardiovascular disease (CVD) includes diseases of blood vessels, heart and vascular diseases of the brain. A cardiovascular event is defined as a death related to coronary disease, non-fatal myocardial infarction, new angina, fatal or non-fatal stroke or transient ischemic attack, or the development of congestive heart failure or peripheral vascular disease (1). (CVD) are the number one cause of death globally: more people die annually from CVDs than from any other cause (2). CVD is responsible for over 17.3 million annual deaths; amounting to 30% of global death, and is the leading cause of morbidity and

mortality from non-communicable diseases worldwide. CVD-related mortality can be reduced by decreasing known risk factors; these include smoking, dyslipidemia, hypertension, diabetes mellitus, excess body weight, psychosocial factors, high dietary fat intake, regular alcohol consumption, and lack of physical activity (3). People with abnormal glucose metabolism, hypertension, obesity, and dyslipidemia constitute a major challenge facing health systems in developed and developing countries. Such people are at substantially increased risk of developing diabetes and cardiovascular diseases (CVDs) (4).

Patients with rheumatoid arthritis (RA) are at a 1.5–3-fold increased risk of CVD events (5, 6). Excess cardiovascular morbidity is also apparent in RA patients. An increased prevalence of myocardial infarction, congestive heart failure, and stroke was present in RA patients (7).

Specifically, data from the National Health and Nutrition Examination Survey (NHANES) 1999–2000 showed that, with the recent increased prevalence of overweight and obesity and the severity of obesity in youths, the prevalence of the metabolic syndrome in adolescents aged 12–19 years has also increased from 4.2% in 1988–1994 to 6.4% in 1999–2000, with 2 million adolescents estimated to have the metabolic syndrome. The prevalence of the metabolic syndrome reached 50% in severely obese (BMI 39.5–41.7 kg/m²) youngsters. This increase in the prevalence of the metabolic syndrome could potentially be associated with an increase in risk of premature CVD (8).

There is little data available regarding CVD risk factors in Erbil city adolescence. The purpose of this study was assessing existence of CVD risk factors among high school students in Erbil City.

II. METHOD

Subjects

A detailed cross-sectional study carried out on high school students in Erbil city from October 2012 to April 2013. This study consist 400 adolescence 153 boys and 247 girls aged 14-17 years old from 8 randomly selected governmental high schools.

Approval to conduct this study was granted by Ethical Committee of Nursing College, and the Erbil Ministry of Education.

Questionnaire Survey

Data was collected through face-to-face interview reporting of the questionnaire format which was about demographic information, smoking, and medical history which was comprised of medical illness such as diabetics and hypertension or CVD of their parents and/ or first degree relatives who died from it

before 50 years old) of the subject . The student considered as a smoker if he/ she smoking one or more cigar/day.

Physical Examination

The physical examination measurements included weight, height and blood pressure.

Anthropometrics: body weight was measured using a digital scale with an accuracy of ± 100 g. Subjects were weighed without shoes, in the minimum clothing possible. Standing height was measured without shoes to the nearest 0.5 cm with the use of a commercial stadiometer, with the shoulders in relaxed position and arms hanging freely. Body Mass Index (BMI) was calculated by dividing weight (kg) by height squared (m²). BMI is defined by the sex- and age- and used as indicator for obesity , overweight, and underweight. Obesity was defined as ≥ 95th percentile, over weight > 85 percentile and underweight < 5th (5).

Blood Pressure (BP) measurement: An electronic sphygmomanometer was used. Students were seated quietly for at least 5 minutes in a chair, with feet on the floor and arm supported at heart level. An appropriate-sized cuff (cuff bladder

encircling at least 80% of the arm) was used to ensure accuracy. Two measurements were taken and the average was recorded. Systolic and diastolic BP were classified according to the standard definitions, as normal BP and hypertension.

III. LABORATORY TESTS

Non-fasting EDTA Random blood was drawn from 400 students. After centrifuging, samples were stored at - 80 C° until analysis. All laboratory analysis were performed in a basic science laboratory at College of Nursing / Hawler Medical University.

We measured random serum glucose by an enzymatic colorimetric method using commercial kits according to the method of (9)

We also measured triglycerides (TG), total cholesterol (TC), high -density lipoprotein (HDL) and low-density lipoproteins (LDL) were measured by an enzymatic colorimetric method using commercial kits according to the method of (9)

IV. RESULTS

Table-1: Distribution of age and gender of participants.

Gender	Age (Years)			Subtotal
	15	16	17	
Male	19(12.93%)	50(34.01%)	78(53.06%)	147(36.75%)
Female	35(13.83%)	135(53.40%)	83(32.81%)	253(63.25%)
Subtotal	54	185	161	400

Four hundred students were randomly selected in the study, 147 (36.75%) males and 235 (63.25%) females aged (15- 17) years.

Table-2: Risk factors for cardiovascular disease.

Age (year)	Gender	Without RF	With one RF (a)	With two RF (b)	With three or more RF (c)	Subtotal a +b +c
15	Male (19)	8	7	3	1	11 (57.8%)
	Female(35)	18	12	5	0	17(48.5%)
16	Male(50)	22	18	7	3	28(56%)
	Female(135)	68	44	17	6	67(49.6%)
17	Male (78)	39	19	14	6	39(50%)
	Female (83)	42	24	16	1	41(49%)

Total	400	197(49.25%)	124 (31%)	62(15.5%)	17 (4.25%)	203 (50.75%)
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In this table the frequency of risk factors were found among student. Among 400 students 197(49.25%), without risk factors,124(31%) with one with one risk factor, 62(15.5%) with two risk factors, and 17(4.25%) with three or more risk factors.

Table_3: Family history risk factors among students

Family history risk factors of students	Age (Years)			Subtotal
	15	16	17	
	F	F	F	
Male	6 (31.6%)	13 (26%)	14 (17.0%)	33 (22.4%)
Female	9 (25.7%)	22 (16.3%)	26 (31.3%)	57 (22.5%)
Subtotal	15 (27.8%)	35 (18.9)	40 (24.8%)	90 (22.5)

F=frequency

There were 90 (22.5%) students had family history risk factors which was their parents and first degree relatives who died from CVD before 50 years old .

Table- 4: Distribution of overweight risk factors among students.

Risk of overweight (BMI) kg/m2	Age (years)			subtotal
	15	16	17	
	F	F	F	
Male	4 (21%)	1 (2%)	4 (5%)	9 (6.1%)
Female	3 (8.5%)	11 (8%)	6 (7.2%)	20 (7.9%)
Subtotal	7 (13%)	12 (6.5%)	9 (11.2%)	29 (7.3%)

In this table we can see the obesity risk factor, high percentage 20(7.3%) was found among female while only 9(6.1%) was found among male.

Table-5: The profile of high blood pressure is shown.

Risk of hypertension(mmHg)	Age (years)			Subtotal
	15	16	17	
Male	5 (26.3%)	12 (24%)	16(20.5%)	33 (22.4%)
Female	7 (20%)	26 (19.25%)	15 (18%)	48 (18.9%)
Subtotal	12 (22.2%)	38 (20.5%)	31(19.25%)	81 (20.25%)

This table shows distribution of hypertension risk factor among participants, there were 33(22.4%) male and 48(18.9%) of female at risk of hypertension.

Table_6: The profile blood lipids risk factors, Random blood sugar, and Rheumatoid arthritis.

Blood profile	Gender	Age(year)			Subtotal
		15	16	17	
Tc(mg/DL)	Male	2 (10.5%)	3 (6%)	5 (6.4%)	10(6.8%)
	Female	3 (8.5%)	6 (4.4%)	7 (8.4%)	16 (6.3%)
TG(mg/DL)	Male	5 (26.3%)	8 (16%)	9 (11.5%)	22 (5%)
	Female	4 (11.4%)	7 (5.2%)	12 (14.5%)	23 (9%)
LDL(mg/DL)	Male	2 (10.5%)	6 (12%)	4 (5.1%)	12 (8.2%)
	Female	6 (17.1%)	8 (5.9%)	7 (8.4%)	21 (8.3%)
HDL(mg/DL)	Male	0 (0%)	1 (2%)	2 (2.6%)	3 (2%)
	Female	0 (0%)	1 (0.7%)	4 (4.8%)	5 (1.9%)
RBG(mmHg)	Male	3 (15.8%)	8 (16%)	6 (7.7%)	17 (11.6%)
	Female	1 (2.9%)	2 (1.5%)	1 (1.2%)	4 (1.6%)
RAIU/ml	Male	3 (15.8%)	7 (14%)	14 (17.9%)	24 (16%)
	Female	2 (5.7%)	18 (13.3%)	2 (2.4%)	22 (8.7 %)

This table shows that the mean value of serum TC (total cholesterol), TG (triglyceride), LDL (low density lipoprotein) , HDL(high density lipoprotein) and RBG(Random blood sugar) were higher among males (6.8%,15% ,2% and 11.6) than their percentages among females (6.3%,9% , 1.9% and 1.6) respectively.This table also shows the prevalence of RA among students, higher percentage of RA were found among males(16%) than females(8.7%).

Table 7-: Distribution of smoking among students.

Smoking	Age			Subtotal
	15	16	17	
	F	F	F	
Male	1(5.3%)	7 (14%)	19 (24%)	0 (18.4%)
Female	0 (0%)	0 (0%)	0 (0%)	27 (0%)
Subtotal	1 (1%)	7 (3.8%)	19 (11.8%)	27 (6.8%)

The above table shows distribution of smoking habit among students. Smoking habit was seen in 27 (18.4%) of the male students, smoking habit was not found among female students. The highest percentages (24 %) of smoking habit were among 17 years age group of male students.

V. DISCUSSION

In our community there were noticeable cardiovascular risk factors (CVRF) among individuals, these risk factors include; Hypertension, High blood glucose level, overweight, triglyceride(TG), total cholesterol(TC), high density lipoprotein (HDL), low density(LDL), Rheumatoid arthritis (RA) and family history risk factors. The demographic characteristic of students were shown in table (1).

In table (2) the distribution of cardiovascular risk factors is presented among 400 students, there were 197(49.25%) of students without risk factors, 124(31%) with one risk factors, 62 (15.5%) with two risk factors and 17(4.25%) with three or more risk factors. The number of female with one risk factor (44) age 16 years old, this finding is similar to those found by Frank and Xuanming, 2003 they reported that CVRF were higher among female than males, also its consistent with previous study in Tanzania by Marina et al., 2009 that CVRF higher among females, this may be due to the family history risk factors which is higher among female as shown in table (3) or may be related to hormonal difference between both sexes or lack of physical activity which is highly associated with increasing body weight (10,11).

Age-adjusted prevalence of CVRF by gender are presented in table (4) a total of 20 (7.9%) of females participant were overweight which is more than the total number of over weighted males participant 9(6.1%), the excess body weight was notable in this study particularly among females, this result is similar to those found by Christensen,2008, the high occurrences of BMI among females may be attributed to the socio-cultural factors, dietary habit, sedentary life style in our community. Among our result there were 4 (21%) male students over weight and they have no intention of losing their weight they have family history for obesity, thus the importance of adjusting our BMI by

maintaining all the preventive rules of CVRF and also students should be aware on area of nutrition and relationship between diet and CVRF.

There was another increasing trend of CVRF was found which was hypertension, in table (5) high percentages was found among males (26.3%), (24%) and (20.5%) respectively for ages 15, 16, and 17, these results is different with those reported previously by (Bovet et al., 2002) In which 13% for males and 18% for females, the lower level of hypertension among female may be attributed to the protective effect of estrogen hormone (Mendelsohn & Karas,1999).

Result of this study revealed that the mean value of serum Tc, TG, LDL , HDL and RBG were higher among males (6.8%,15% ,2% and 11.6) than their percentages among females (6.3%,9%

, 1.9% and 1.6) respectively for each profile as shown in table (6). It's widely accepted that CVD is associated with hypertension and increased blood level of LDL, TC and TG in contrast a low level of HDL is risk factor to CVD (Mora et al., 2013); but for RBG our result is differ from those reported by (Ekpenyong et al, 2012) in previous study which showed the prevalence of RBG was higher in females than males.

The distribution of seropositive rheumatoid arthritis risk factor was frequently more in male (16.3%) than females (8.7%) as in table (6), thus risk for developing CVD event in person with RA is approximately double than age and gender matched person without CVD (Del Rincon,2001).

Van Doorman, 2002 from data of his research suggested that smoking may be risk factor for developing RA especially seropositive individuals, perhaps the presence of chronic inflammation enhance the atherogenic effect of cigarette smoking, and the two factors act in synergy to increase CVD in RA positive one.

Current smoker percentages were (18.4%, and 0%) for each male and female as presented in table (7), this may be related to the fact that female traditionally smoked much less than male in our community, its similar to those found by Jayo et al.,2002 that women smoked less than men. In our study smoking rate was limit but it's remaining as an important factor for hypertension

and CVD and this because more prevention programs are applicable in our schools.

REFERENCES

- [1] Ibrahim Al Alwan, , Motasim Badri, Maram Al-Ghamdi, Alanoud Aljarbou, Hessa Alotaibi, Hani Tamim, Prevalence of Self-reported Cardiovascular Risk Factors among Saudi Physicians: A Comparative Study, 2013, International Journal of Health Sciences, Qassim University, Vol. 7, No. 7
- [2] Jawad A. AL-Lawati, ALI J. Mohamed, Halima Q. AL-Hinail, Peka Jousilahti, Prevalence of the Metabolic Syndrome Among Omani Adults, 2003, Diabetes Care Vol.26:No.6, p:1781–1785
- [3] Beatriz L. Rodriguez, Willfred Y. Fujimoto, Elizabeth J. Mayer-Davis Giuseppina Imperatore, Desmond E. Williams, Ronny A. Bell, R. Paul Wadaw, Shana L. Palla, Lenna L. Liu, Ann Kershner, Stephen R. Danils, Barbara Linder, Prevalence of Cardiovascular Disease Risk Factors in U.S. Children and Adolescents With Diabetes, 2006,diabetes care;Volume 29, Number 8, p:1891-1896
- [4] Roya Kelishadi, Gholamhossein Sadri, Ali Akbar Tavasoli, Manijeh Kahbazi, Hamid Reza Roohafza, Masoumeh Sadeghi, Alireza Khosravi, Babak Sabet, Ahmad Amani, Rezvan Ansari, Hassan Alikhassy, Cumulative prevalence of risk factors for atherosclerotic cardiovascular diseases in Iranian adolescents: IHHP-HHPC,2005, J Pediatr (Rio J). ;81(6), p:447-453
- [5] Hee Man Kim, Jong Park, Ho-Seong Kim, Duk Hee Kim, and Sung Hoon Park, Obesity and Cardiovascular Risk Factors in Korean Children and Adolescents Aged 10–18 Years from the Korean National Health and Nutrition Examination Survey, 1998 and 2001, 2006, American Journal of Epidemiology: Vol. 164, No. 8, p: 787-793.
- [6] Avina-Zubieta JA, Choi HK, Sadatsafavi M, Etminan M, Esdaile JM, Laccaille D. Risk of cardiovascular mortality in patients with rheumatoid arthritis: a meta-analysis of observational studies. Arthritis Rheum 2008; 59:1690–7.
- [7] Wolfe F, Freundlich B, Straus WL. Increase in cardiovascular and cerebrovascular disease prevalence in rheumatoid arthritis. J Rheumatol 2003;30:36–40.
- [8] Wolfe F, Straus WL. Increased prevalence of cardiovascular and cerebrovascular disease in rheumatoid arthritis compared with osteoarthritis [abstract]. Arthritis Rheum 2000;43 Suppl 9:S133.
- [9] Ashleigh L. May, Elena V. Kuklina and Paula W. Yoon. 2012 Prevalence of Cardiovascular Disease Risk Factors Among US Adolescents, 1999-2008, PEDIATRICS Volume 129, Number 6
- [10] Shivananda Nayak B. Manpal Manual of Clinical Biochemistry. 2nd edn. 2005.
- [11] Frank,H.; Xuanming,H.O. Prevalence of coronary heart disease risk factors of Hong Kong secondary school students.(2003);1(1);23-32.
- [12] Marina,A.,Njelekela; Rose,Mpembein, Alfa, Muhihil,Nuru,L., Mligiliche;Donna; spigelmsn;Ellen, Hertzmark;Enju;Julia,L.;Franke;Istein;Wafai,W.;Fawzi;walter,C.;Willett and Jacobe,Mtabaji. Gender related differences in the prevalence of cardiovascular disease risk factors and their correlates in Urban Tanzania.Biomedical central (BMC) Http://www.biomed central.com/1471-2261/9/30.
- [13] Christensen,DL.; Elise; Hansen,AW.; Larsson,MW.,Mwaniki,DL., Kilonzo,B.;Boit,MK.;Kaduka,L.;Borch-Johnsen.K, et al.,obesity and regional fat distribution in Kenyan populations: impact of ethnicity and urbanization. Ann. Hum.biol.2008,35(2):232-249.
- [14] Jayo,K.; Edward,R.;Mugusi,F.;whiting, D.,Unwin,N.:Tobacco smoking in Tanzania, East Africa:population based smoking prevalence using expired alveolar carbon monoxide as a validation tool.Tob control 2002,11(3):210-214.
- [15] Mora S, Glynn RJ, Ridker PM. High-density lipoprotein cholesterol, size, particle number, and residual vascular risk after potent statin therapy. Circulation. 2013;128(11):1189–1197.
- [16] S. Van Doornum, I G. McColl, 2 and I. P. Wicks. Accelerated Atherosclerosis: An Extraarticular Feature of Rheumatoid Arthritis. ARTHRITIS & RHEUMATISM Vol. 46, No. 4, April 2002, pp 862–873.
- [17] Del Rincon I, Williams K, Stern MP, Freeman GL, O’Leary DH, Escalante A. Association between carotid atherosclerosis and markers of inflammation in rheumatoid arthritis patients and healthy subjects. Arthritis Rheum. 2002;48:1833–40.
- [18] Mendelsohn,Me.; Karas,Rh.:The protective effects of estrogen on the cardiovascular system. N. Engl. J.Med.1999;340(23): 1801-1811.
- [19] Ekepenyong,Chris,E.;Akpan,U.P.;Ibu,John,O.; Nyebuk,Daniel,E.: Gender and age specific risk factors of type 2 diabetes mellitus in Uyo metropolis, South Eastern Nigeria.diabetologia croatica; (2012)41-1.
- [20] Bovet,P.;Ross,Ag;Gervasoni,JP.;Mkamba,M; Mtasiwa,Dm;Lengeler,C.;Paccaud,F: distribution of blood pressure,body mass index and smoking habits in urban population of dar es Salaam,Tanzania and associated with socioeconomic status.

AUTHORS

First Author – Khanzad Hadi Rashid
Second Author – Sadiya Abdulla Mawlud
Third Author – Amanj Zrar Hasan
Fourth Author – Salar Saady