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Cardiovascular Disease Health Risk Appraisal in King Abdulaziz University, Jeddah

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ABSTRACT. A Health Risk Appraisal program was used in King Abdulaziz University to assess the health status of university staff and employees. The program was accepted by all the participants and was a first step in detecting the cardiovascular disease (CVD) risk factors aiming to modify the negative attitude and practice. Unfavorable habits were reported by the participants: 24.0% were current smokers, 50.0% were overweight, and 65.00/0 consumed a high-fat diet. Moreover, hypertension accounted for 22.0% and diabetes for 9.0%. The men practiced these unfavorable habits more than the women. Hypercholesterolaemia accounted for 9.00/0 and was significantly related to old age (40 years and over) and smoking habits. The 5-year risk of CVD predicts that 24.00/0 of men and 9.00/0 of women are at highest risk to develop CYD in the coming half decade. Health strategies are recommended to decrease the risk of CVD and improve the quality of life.

Keywords: Cardiovascular risk--Saudi

Introduction

Cardiovascular disease (CVD) represents one of the most important health problems and is a leading cause of death. CYD is known to be a multifactorial disease in which a variety of factors are involved[I]. Several characteristics have been shown to be the major contributors for the development of CYD, particularly, hypercholesterolaernia, hypertension, smoking habits, diet, and obesity[2]. Most of these factors could be efficiently modified by potent preventi ve measures.

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In King Abdulaziz University we were keen to evaluate the health status of the workers in order to identify those at highest risk in developing CYD and, consequently, in need of specific health promotion programs. We adopted the Health Risk Appraisal (HRA) program to assess the health condition of staff and employees[3-S].

The objectives of the study were to:

I. Determine the prevalence of CYD risk factors among university staff and employees.
2. Determine the prevalence of hypercholesterolaemia and its relation to the various risk factors.
3. Estimate the probability of development of CYD over five years.

Materials and Methods

A multi-stage random sampling of King Abdulaziz University teaching staff and employees was taken. A first-stage stratified random sampling with proportional allocation was done to determine the proportion of the total sample for each of the three staff groups: college, deanship, and administration. This was followed by a second-stage systematic sampling to collect the required number of subjects in each group based on its size.

The total sample size was calculated to achieve a confidence level (a) of 0.05 and power (B) of 0.20 with a minimum prevalence of 0.05 for the factors under study. This resulted in a total of around 1000 subjects (male and female). The sample size was proportionally divided for the various groups (college, deanship and administration).

Data was collected by in-person interviewing using a structured questionnaire and direct observation (e.g., anthropometric, blood test, and blood pressure measurements).

Fasting blood cholesterol *(mg/dl)* was measured using Retletron^R Boehringer Mannheim GmbH. Hypercholesterolaemia was defined as a·cholesterollevel of ≥ 240mg/dl[6-101. The body mass index was calculated as weight in Kg/(height in m)2 and classified into normal (> 27.2 for men and < 26.9 for women) and overweight (≥ 27.2 for men and ≥ 26.9 for women)! 111. Hypertension was defined as any case with a systolic blood pressure ≥ 140 mmHg and/or a diastolic blood pressure ≥ 95. Diabetics were those who reported to have diabetes mellitus and receive regular medical support. A high-fat intake was considered according to the frequency of reported organ meat (liver and kidney) consumption. Participants were classified according to their type of work: teaching staff (with/without administrative assignment), administration staff, and others (technicians, laborers, drivers, and security personnel).

Data analysis was done using SPSS/PC computer package. Univariate analysis was performed and chi-square test was used to determine the association between each independent variable and dependent variable (hypercholesterolaemia). As the risk factors were highly related, multiple logistic regression analysis was done to detect the impact of the various risk factors on hypercholesterolaimia'Vl. Some categories were grouped together to overcome the presence of a few cases in some of the cells.

There are several available methods for calculating the risk of development of CVD over five years[13-17]. We used the method described by Thorsen[13] and Taylor[15] as it makes use of the logistic formula that is well suited for computer program and is more appropriate to describe the multivariate CVD profile.

The probability of getting a heart attack within a 5-year period (P5) was calculated as follows:

$$P_{(5)} = 1/(1+e^{-Q})$$

Where $Q = B_0+B_1X_1+B_2X_2+B_3X_3+B_4X_4$

Where and

X_1 = serum cholesterol (mg/dl)	B_0 = -11.2040
X_2 = diastolic blood pressure (mmHg)	B_1 = 0.00864677
X_3 = number of cigarettes/day	B_2 = 0.0378064
X_4 = age (years)	B_3 = 0.0256160
	B_4 = 0.0500791

Then P(5) was divided in five quintiles of equal size. The proportion of cases classified as at highest risk (fifth quintile) and the ratio (Q5/Q1) of those classified as at highest risk (fifth quintile) to those classified as at least risk (first quintile) were used for the predictability of the group at highest risk[17].

Results

A total of 1,016 people participated in the study. There were 717 men (70.6%) and 299 women (29.4%). Table 1 shows the prevalence of CVD risk factors by gender. About half of the participants were 40 years of age and over. The men were older than the women as the proportion of men of 40+ years *(56.20/0)* was significantly higher than that of the women in the same age group *(42.30/0).* In the men's group, the majority had teaching or other assignments while the majority of women were among the teaching staff or performed administrative jobs.

TABLE 1. Prevalence of CYD risk factors by gender.

		Men		Women		Total	
Age***	Total	715		298		1,013	
20 - 29	no. (%)	83	(11.6)	54	(18.1)	137	(13.5)
30 - 39	no. (%)	230	(32.2)	118	(39.6)	348	(34.4)
40+	no.(%)	402	(56.2)	126	(42.3)	528	(52.1)
Type of work	Total	717		299		1,016	
teaching	no. (%)	293	(40.9)	121	(40.5)	414	(40.7)
administration	no. (%)	188	.(26.2)	115	(38.5)	303	(29.8)
employees	no. (%)	236	(32.9)	63	(21.03)	299	(29.4)
Smoking habits"	Total	713		298		1,011	

TABLE 1. Contd.

		Men		Women		Total	
none	no. (%)	412	(57.8)	246	(82.6)	658	(65.1)
ex-smoker	no: (%)	100	(14.0)	6	(2.0)	106	(10.5)
cigarette ± shesha	no. (%)	137	(19.2)	25	(8.4)	162	(16.0)
shesha only	no. (%)	64	(9.0)	21	(7.0)	85	(8.4)
Diet	Total	717		299		1,016	
high-fat**	no. (%)	497	(69.3)	162	(54.2)	659	(64'.9)
Body mass index	Tota]	709		294		. 1,003	
overweight	no. (0/0)	351	(49.5)	148	(50.3)	499	(49.8)
Health status	Tota]	716		292		1,008	
diast. ≥ 95 mmHg*	no. (%)	85	(11.9)	17	(5.8)	102	(l0.1)
syst. ≥ 140 mmHg**	no. (%)	178	(24.9)	32	(10.9)	210	(20.8)
hypertension**	no. (%)	185	(25.8)	35	(12.0)	220	(21.8)
diabetes**	no. (%)	75	(10.5)	13	(4.3)	88	(8.7)

* $P < 0.05$
** $P < 0.01$
*** $P < 0.001$

Current smoking (cigarettes and/or shesha) was reported by 24.4.% of the cases. About *81.00/0* of the smokers were men. Current cigarette (with/without shesha) smokers accounted for 65.6% of the smokers while current shesha smokers accounted for 34.4%.

The diet pattern has showed that 64.9% of participants consumed high fat diet (organ meat: liver and' kidney). The men reported a higher fat diet consumption than the women. About half of the participants were classified as overweight; this was seen in both genders.

High diastolic blood pressure accounted for 10.1% of the participants while a high systolic blood pressure accounted for 20.8%. Hypertension accounted for 21.8% of the cases. Hypertension and its two components were more pronounced in the men than in the women. Diabetes was reported by 8.7% of the participants. Still, the men were more affected than the women.

The mean cholesterol level was I75.5mg/dl and was within normal value for all. variable categories. Table 2 shows the prevalence of hypercholesterolaernia (cholesterol ≥ 240mg/dl) and its relation to CVD risk factors by gender. Hypercholesterolaemia accounted for 79 cases *(9.00/0).* The proportion of the cases reporting hypercholesterolaemia 'showed an increase with the increase in age, but the association between hypercholesterolaemia and age did not reach statistical significance. Hypercholesterolaemia was more pronounced among current smokers (cigarette and/or shesha smokers) but still the results were not.significant. The prevalence of hypercholesterolaemia was slightly higher in women (9.3%) than in men *(8.80/0)* but this difference did not reach statistical significance. A higher prevalence of hypercholesterolaemia in women was mainly seen in the high risk groups being diabetic (23,1% among women vs 10.9% among men), overweight (10.7% among women vs 7.5% among men), current smokers (16.7% among women vs *11.00/0* among men), and of 40 years of age and over (12.1 % among women vs 9.9% among men).

TABLE 2. Prevalence of hypercholesterolaemia (cholesterol ≥ 240 mg/dl) and its relation to cardiovasvular risk factors by gender.

	Men			Women			Total		
	Total	No.	%	Total	No.	%	Total	No.	%
Total	599	53	8.8	281	26	9.3	880	79	9.0
Age									
20 - 29	62	1	1.6	51	4	7.8	113	5	4.5
30 - 39	193	17	8.8	113	48	7.1	306	25	8.2
40+	342	34	9.9	116	14	12.1	458	48	10.5
Type of work									
teaching	241	24	10.0	111	11	9.9	352	35	9.9
administration	167	12	7.2	110	7	6.4	277	19	6.9
employees	191	17	8.9	60	8	13.3	251	25	10.0
Smoking habits									
none	346	27	7.8	232	19	8.2	578	'46	8.0
ex-smoker	86	7	8.1	6	0	0.0	92	7	7.6
current smoker	163	18	11.0	42	7	16.7	205	25	12.2
High-fat diet									
no	183	14	7.7	124	9	7.3	307	23	7.5
yes	416	39	9.4	157	17	10.8	573	56	9.8
Body mass-index									
normal	297	30	10.1	136	11	8.1	433	41	9.5
overweight	294	22	7.5	140	15	10.7	434	37	8.5
Hypertension									
normal	445	37	8.3	240	22	9.2	685	59	8.6
hypertension	154	16	10.4	35	4	11.4	189	20	10.6
Diabetes									
normal	535	64	8.6	268	23	8.6	803	69	8.6
diabetic	64	7	10.9	13	3	23.1	77	10	13.0

The proportion of cases reporting hypercholesterolaemia did not statistically differ, neither by nutritional status (normal vs. overweight) nor high-fat intake. Hypercholesterolaemia was reported more by the hypertensives and diabetics than by the normal participants, but results were not statistically significant.

Table 3 shows the logistic regression model fitted to detect the impact of the different risk factors on hyperchlesterolaemia. The proportion of cases reporting hypercholesterolaemia showed an increase with the increase in age. Those in their thirties were at double risk while those in their forties or over were 2.7 times more at risk in developing hypercholesterolaemia and results were borderline (P =0.0530). Smoking habits was the second risk factor that seemed to be related to hypercholesterolaemia. Current smokers (cigarette and/or sheesha smokers) were about 1.9 times more at risk in developing hypercholesterolaemia than non-smokers and the results were borderline (P = 0.0517). Teaching staff and other non-administrative workers were about 1.5 times more at risk than those performing administrative work only, but the results were not statistically significant. Hypertensives, diabetics, and those consuming high-fat diet were at a higher risk of hypercholesterolaemia than the norma] participants but still the results did not reach statistical significance.

TABLE 3. Logistic regression analysis to detect the impact of risk factors on hypercholesterolaemia (cholesterol ≥ 240 mg/dl).

Risk Factors	Categories	Odds Ratio	95%CI	P - value
Age (yrs.)				0.1305
	20 - 29	1.0		
	30 - 39	2.0	0.7 - 5.6	
	40+	2.7	1.1-7.5	
Sex				0.1106
	men	0.6	0.4 - 1.1	
	women	1.0		
Type of work				0.3839
	administration	1.0		
	teaching staff	1.5	0.8 - 2.9	
	employees	1.4	0.7 - 2.8	
Smoking habits				0.0567
	none	1.0		
	ex-smokers	1.0	0.4 - 2.4	
	current smokers	1.9	1.1 - 3.3	
Body mass index				0.2843
	normal	1.0		
	overweight	0.8	0.5 - 1.3	
High-fat diet				0.1924
	no	1.0		
	yes	1.4	0.8 - 2.4	
Blood pressure				0.6685
	normotensive	1.0		
	hypertensive	1.1	0.6 - 2.0	
Diabetes mellitus				0.4588
	normal	1.0		
	diabetic	1.3	0.6 - 2.9	

Table 4 shows the probability of development of CVD over five years (depending on serum cholesterol, diastolic blood pressure, number of cigarettes/day, and age).

There were *19.30/0* classified as at highest risk (fifth quintile). The men were at a higher risk than the women in developing CVD as *24.20/0* of the mena and only 8.8% of the women were classified in the fifth quintile (Q5). The Q5/Ql ratio has shown that the men were 1.6 times more represented in the highest risk group (Q5) than the least risk group (Ql), while the ratio was inverted for the women and accounted for 0.3.

TABLE 4. Risk of development of CVD over five years.

	Men	Women	Total
	(n =595)	(n = 274)	(n= 969)
QI	88	85	173
Q2	104	89	193
Q3	122	42	164
Q4	137	34	171
Q5	144	24	168
Q5/QI	1.6	0.3	1.0
% of events in Q5	24.2	808	19.3

Discussion

The Health Risk Appraisal was a useful tool in assessing the health status of the King Abdulaziz University working staff. An overview of the CVD risk indicators in our staff and employees was obtained, offering a base for the needed health strategy and the action definition[17].

Risk factor measurement has an important implication not only for estimation of the prevalence, but for identification and management. Our results have shown that certain unfavorable habits exist among university staff and employees; all are modifiable cardiovascular risk factors. Among these habits, smoking, with an overall prevalence of 24.4%, is more prevalent among men (28.2%) than women (15.4%) (cigarette and/or shesha). In our study, the prevalence of smoking habits among men is higher than previously published results [8,19] which was around 24.0%, while in women it was lower. This may be due to cultural differences, as women tend to under report smoking habits.

Moreover. about *65.00/0* reported to consume a high-fat diet. Men were still more likely to consume a high-fat diet than women. The nature of the questionnaire in the Health Risk Appraisal program was limited to organ meat consumption (liver and kidney) and probably, if measured by a diet questionnaire, it might have thrown light on the diet habits prevalent in our society.

Also, about half of the participants were classified as overweight; this was seen in both men and women. Our results are slightly lower than previously published studies [18] where two-thirds were reported to be overweight. This difference in proportion could be related to the difference in definition of obesity used, as their cut-off point for body mass index was 25 for both men and women and in our study, we defined overweight as a body mass index ≥ 27.2 for men and ≥ 26.9 for women.

In our study, systolic hypertension accounted for 20.8% and was more pronounced among men (24.9%) than women (10.9%). These results are very high compared to previously published prevalence of hypertension[18,19]. For the diastolic blood pressure our results were still higher. These differences could be explained by the. difference in definition of hypertension used (L60/95 in previous studies vs. 140/90 in our study).

In our study, the mean cholesterol level accounted for 175.5 mg/dl and was nearly similar to the results previously published on the Saudi population[20]. Moreover, hypercholesterolaemia that is intimately related to CVD[21-25] accounted for 9.0% of the participants and was slightly higher in women than men but the results were not significant. Hypercholesterolaemia in women was mainly among the older age, overweight, diabetic, and current smokers.

In our model, age and smoking habits were the risk factors probably associated with hypercholesterolaemia. Those of 40 years and over were at about triple risk, and the current smokers were at about double risk.

The risk of development of CVD over five years (considering the serum cholesterol, diastolic blood pressure, number of cigarettes/day and age) has shown that 19.3% were at highest risk in developing disease in the coming years. The results should be regarded with caution as in previous studies[21], Fifty percent of those classified as highest risk actually developed CVD at a later time. CVD is known to be a multifactorial disease[l] in which various factors participate according to their weight. The effect of these factors could be initially hidden, but the accumulation of these factors over time manifests progressively. Men were more represented in the highest risk group--24.0% of men compared to 8.8% of women were classified as at highest risk. Moreover, men were found to be more liable to practice unfavorable habits such as smoking and a high-fat consumption in addition to being hypertensive and diabetic. This alone or in combination with aging puts them at great risk over time.

Evidently, most of the CVD risk factors are modifiable. Our ambition is to design a prevention program intending to alter the unfavorable habits. A package of health education preventive services aimed in explaining the hazards of smoking, the benefits of a balanced diet intake, reducing weight, and the value of regular medical check-ups to control hypertension, hypercholesterolaemia and diabetes, will achieve considerable health gains in term of survival and quality of life.

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تقييم المخاطر الصحية المواتية للإصابة بأمراض القلب والجهاز الدوري بين منسوبي جامعة الملك عبدالعزيز ، جدة

بهاء أباالخيل ، توفيق الغبرة ، Jحسين البار

قسم طب المجتمع , كلية الطب والعلو إ الطبية , جامعة الملك عبدالعزيز ,

جـــدة , المملكة العربية السعودية

المستخلص . تم استخدا إ مقياس المخاطر الصحية لتقييم الوضع الصحي للمواظفين والعاملين في جامعة الملك عبدالعزيز . البرنامج كان مقبولا من جميع المشتركين في الدراسة ، التي تعتبر خطوة أولية نحو اكتشاف العوامل الخطرة المسببة لأمراض القلب والجهاز الدوري بغرض تعديل السلوكيات والتوجهات السلبية . العادات السلبية التي ذكرت من قبل المشتركين كانت على النحو التالي :- • , ٢٤٪ مدخنين حاليين ، • , ٥٠٪ زيادة في الوزن ، • , ٦٥٪ يتنالون أغذية ذات مستوي عالي من الدهون . أضافة الي ذلك شكل الافراد ذوي ضغط الدم العالي ما نسبته • , ٢٢٪ ونسية الأفراد الذين يعانون من البوال السكري كانت • , ٩٪ . كما أن نسبة الذكور في الممارسات المواتية لأمراض القلب والجهاز الدوري كانت أعلى من تلك التي في الإناث . كما شكل الأفراد الذين عندهم ارتفاع في كولسترول الدم ما نسيته • , ٩٪ . الارتقاع في كولسترول الدم ارتبط ارتباطا يعتد به إحصائيا مع السن (40 سنة وأعلى) ومع ممارسة عادة التدخين . تقدير احتمالات الاصابة بأمراض القلب والجهاز الدوري للخمسة سنوات القادمة ، تشير ألي أن • , ٢٤٪ من الذكور J • , ٩٪ من لإناث معرضين للإصابة بأمراض القلب والجهاز الدوري خلال نصف العقد القادم • لذلك يوصى بوضع خطط صحية مستقبلية معى بتقليل المخاطر المواتية لأمراض القلب والجهاز الدوري كما تعنى بالتحسين التوعوي لطريقة الحياة .