Heart disease risk factors: prevalence and knowledge in a primary care setting, Saudi Arabia

A.Z. Taha[1] and H. Bella [1]

عوامل اختطار الأمراض القلبية : معدل انتشارها ومدى معرفتها في مركز للرعاية الأولية بالمملكة العربية السعودية

عطية زين العابدين طه وحسن بلّه

خلاصة : تم تقرير معدل انتشار عوامل اختطار مرض القلب الإكليلي ومدى معرفتها بين المترددين على مركز الرعاية الصحية الأولية بجنوب غرب الثقبة . فأجريت دراسة على عينة عشوائية مكونة من 227 من السعوديات والسعوديين المراجعين ممن يبلغون ثمانية عشر عاماً من العمر فأكثر . ولقد تبين أن أكثر عوامل الاختطار انتشارا الداء السكري (28.7%) والسمنة (37.9%) وعدم ممارسة الرياضة البدنية (68.3%) وكان أكثر عوامل الاختطار شيوعاً بين الذكور والداء السكري (55.6%) بينما كانت السمنة هي الأكثر شيوعا بين النساء (42.3%) . ولم يعرف عوامل الاختطار أو طرق الوقاية إلا أقل من نصف العينة . وكانت المعرفة بعوامل الاختطار وبطرق الوقاية مرتبطة بالمستوى التعليمي بدرجة يعتد بها إحصائياً (P<0.001) .

ABSTRACT The prevalence and knowledge of coronary heart disease risk factors among persons attending South-west Thogbah primary health care centre were assessed. A random sample of 227 male and female Saudi attendees aged ≥ 18 years was assessed. The prevalent risk factors were diabetes mellitus (28.2%), obesity (37.9%) and lack of physical exercise (68.3%). Diabetes mellitus was the most prevalent risk factor among males (55.6%), while obesity was the main one among females (42.3%). Less than half of the sample knew about the risk factors and preventive measures. Knowledge of risk factors and prevention was significantly associated with educational level ($P < 0.001$).

Prévalence et connaissance des facteurs de risque de cardiopathie dans un établissement de soins de santé primaires en Arabie saoudite

RESUME La prévalence et la connaissance des facteurs de risque de cardiopathies coronariennes parmi les personnes fréquentant le centre de soins de santé primaires de Thogbah Sud-Ouest ont été évaluées. Un échantillon aléatoire composé de 227 saoudiens et saoudiennes âgés de 18 ans et plus se rendant en consultation dans ce centre a été analysé. Les facteurs de risque courants étaient le diabète sucré (28,2%), l'obésité (37,9%) et le manque d'exercice physique (68,3%). Le diabète sucré était le facteur de risque le plus fréquent chez les hommes (55,6%) tandis que l'obésité était le principal facteur de risque chez les femmes (42,3%). Moins de la moitié des personnes comprises dans l'échantillon connaissaient les facteurs de risque et les mesures préventives. La connaissance des facteurs de risque et de la prévention était liée de manière significative au niveau d'instruction ($P<0,001$).

[1]*Department of Family and Community Medicine, College of Medicine and Medical Sciences, King Faisal University, Dammam, Saudi Arabia.*

Received: 19/03/97; accepted: 28/10/97

Introduction

Evidence of increased risk of coronary heart disease (CHD) with the presence of specific risk factors has been documented in previous epidemiological studies, such as the Framingham Heart Study [*1*], the Multiple Risk Factor Intervention Trial [*2*] and others [*3*]. In Saudi Arabia, improved socioeconomic conditions in the past two decades have been followed by rapid changes in the lifestyle of the people brought about by urbanization and availability of housing, food and high purchasing power. Consequently, conditions commonly affecting affluent societies, such as CHD, diabetes mellitus (DM), obesity, cancer and road traffic accidents have started to emerge [*4*]. Published literature has not shown the magnitude of the problem of CHD and risk factors in Saudi Arabia. Hospital-based studies have shown that smoking, hypertension and DM are the common risk factors among patients with acute myocardial infarction [*5–7*]. A recent study on CHD mortality in the Eastern Province of Saudi Arabia, using proportionate mortality ratio, has shown that 26% of total deaths were recorded as CHD death comprising 27.0% of total male and 23.5% of total female deaths respectively [*8*]. Several studies among Saudi populations have shown an increasing prevalence of DM [*9–13*], smoking [*14*] and obesity [*15*]. A recent national survey showed an increasing prevalence of DM, obesity and hypercholesterolaemia [*16*].

Knowledge of the causative factors and methods of prevention of CHD are essential in order to reduce morbidity and mortality from them. The objectives of this study were to determine the prevalence of CHD risk factors among attendees of the South-west Thogbah (SWT) primary health care centre and assess their knowledge of the causes of CHD and its prevention. The centre is in Al-Khobar area, Eastern Province, Saudi Arabia.

Subjects and methods

This was a cross-sectional study on Saudi male and female attendees aged ≥ 18 years at SWT primary health care centre. The catchment population in 1992–1993 was 24 893. The centre is the first health care contact point for all those living in the catchment area. The majority of the SWT population are from the middle and low socioeconomic classes (in terms of income and education). The average number of attendees of the SWT centre is 150 per day. With a total of 22 working days per month, the average population of attendees is 3300 per month.

From previous studies, the estimated prevalence rates of hypertension, DM, smoking and obesity in Saudi Arabia were 10%, 5%, 30% and 25% respectively. Taking the highest expected prevalence of smoking and using the formula for sample size [*17*], the sample of attendees was estimated as 322, i.e. $n = [(1.96)^2 \times 0.3 \times 0.7]/(0.05)^2$. Using the correction factor formula [*17*], the minimum sample size estimated was 249 (about 7.5% of the total monthly attendees). A sample of 250 attendees (100 males and 150 females) were included using a systematic random process and selecting every 15th attendee. The ratio of male to female attendees in the SWT centre is 1:1.5. The study was conducted over a period of one month studying about 10 attendees every day.

Data were collected using a structured questionnaire in Arabic, which was modified from the American Heart Association of South-east Pennsylvania hypertensive screening questionnaire [*18*] and from the CHD risk factors survey questionnaire used previously by our Family and Community Medicine Department [*19*]. The question-

naire for male attendees was administered by the first author, while the one for females was administered by a trained female nurse. CHD risk factors investigated and/or measured included high blood pressure, DM, cigarette smoking, obesity, lack of exercise and family history of CHD. For logistic reasons, plasma cholesterol and triglyceride levels were not measured. No attempt was made to determine the presence or absence of CHD among the studied subjects.

An educated attendee was defined as one having one or more years of formal school education. Knowledge of causes and prevention of CHD were graded as 0 for "don't know" and 1 for mentioning at least one major risk factor and one preventive method. One reading of blood pressure (BP) was made on the right arm using a standard mercury sphygmomanometer in the physician's consulting room after the person was seated for 5 minutes. Systolic pressure was taken as the level of appearance of the first Korotkoff sounds and diastolic pressure was taken as phase 5 of Korotkoff sounds. BP levels were defined as normal (systolic < 140 mmHg with diastolic < 90 mmHg), borderline hypertension (systolic 140–159 mmHg and/or diastolic 90–94 mmHg), definite hypertension (systolic ≥ 160 mmHg and/or diastolic of ≥ 95 mmHg) and uncontrolled hypertension (BP ≥ 160/95 and under treatment).

Weight was measured in kilograms using a standard beam scale with subjects barefooted and wearing their usual light clothes. Weight was recorded to the nearest 100 g. Height was measured in centimetres on a calibrated height board attached to the beam scale. Obesity was measured by the body mass index (BMI) and was classified as overweight (BMI = 25.0–29.9 kg/m^2), obese (BMI = 30.0–39.9 kg/m^2) and morbidly obese (BMI ≥ 40.0 kg/m^2). DM was diagnosed according to the World Health Organization criteria by measuring blood glucose values after fasting and 2 hours after a 75g glucose load. A value of ≥ 11.1 mmol/l (≥ 200 mg/dl) 2 hours after the glucose load was considered to be diagnostic for DM. Smoking was classified as current smokers, ex-smokers (having stopped at least 6 months before) and non-smokers. Exercise (leisure time) was classified as regular (three or more times per week for at least 20 minutes), irregular (less than three times per week) and no exercise. Demographic data and data on medical conditions of the attendees were validated by reviewing the family health records. Reliability was enhanced by pretesting the questionnaire, using one male and one female interviewer, using clear written instructions, standardizing measurements and training the female interviewer. Health education, with the distribution of a booklet, was given. Those with a diastolic BP > 90 mmHg were advised to have their BP measurements repeated.

Data were analysed using *SPSS*. Statistical tests of significance used were χ^2 and *t*-tests. The significance level was taken at 5%.

Results

About 91% (227) of the original sample were interviewed, comprising 90 males and 137 females. The mean age of the population studied was 36.1 ± 12.1 years, being 41.5 ± 11.2 years for males and 32.5 ± 11.4 years for females. Males were significantly older than females ($P < 0.001$). The population of educated males was significantly higher than that for females (81.1% versus 42.3%; $P < 0.001$). More than 50% of females were illiterate.

Table 1 shows the prevalence of risk factors for CHD among attendees by sex. The most common risk factors identified

Table 1 **Prevalence of some risk factors for coronary heart disease (CHD) among attendees by sex**

Risk factor	Males (n = 90)		Females (n = 137)		Total (n = 227)	
	No.	%	No.	%	No.	%
Positive family history of CHD and/or premature death	2	2.2	7	5.1	9	4.0
Cigarette smoking						
Current smoker	28	31.1	0	0	28	12.3
Ex-smoker	23	25.6	0	0	23	10.1
Hypertension						
Definite	5	5.6	7	5.1	12	5.3
Borderline	10	11.1	6	4.4	16	7.0
Uncontrolled	1	1.1	3	2.2	4	1.8
Diabetes mellitus	50	55.6	14	10.2	64	28.2
Obesity (BMI $\geq$ 30 kg/m^2)	28	31.1	58	42.3	86	37.9
Lack of physical exercise	39	43.3	116	84.7	155	68.3
Two or more modifiable risk factors (smoking, DM, hypertension, obesity)	25	27.8	19	13.9	44	19.4

were lack of physical exercise, obesity and DM. DM was the main risk factor in males, while obesity was the main one in females. About 19.4% of attendees had two or more modifiable risk factors with a higher proportion (27.8%) in males.

The prevalence of definite hypertension did not differ significantly by sex. One-third of hypertensive patients under treatment still had uncontrolled blood pressure. The prevalence of hypertension increased significantly with age from 1.3% in those aged 18–29 years to 23.1% in those aged $\geq$ 60 years. A similar increase was seen in both sexes. At age 60 years and above, the prevalence of definite hypertension was 25.0% in males and 20.0% in females.

Of the current smokers, 29.2% had been smoking for less than 5 years, 33.3% for 5–9 years and 37.5% for 10 years or more. About 43% smoked 11–20 cigarettes per day while 18% smoked more than 20 cigarettes per day.

Overweight and obesity were highly prevalent among both males and females (Table 2). About 7.3% of females were morbidly obese. Although obesity was higher in females than males, the difference was not statistically significant when analysed by age group (< 20 years, 20–34 years, 35–49 years, $\geq$ 50 years). More than two-thirds of attendees did not take any type of physical exercise. Of those who exercised, 55.6% performed it regularly.

As shown in Table 3, less than half of attendees knew about the causes and prevention of CHD (41.0% and 40.1% respectively). Of the 227 attendees, the main causes of CHD mentioned were smoking (17.6%), overeating and obesity (17.6%), hypertension (7.9%) and lack of physical exercise (6.2%). DM, a common health

Table 2 **Obesity among attendees by sex**

Body mass index (BMI) (kg/m²)	Males No.	%	Females No.	%	Total No.	%
Less than normal (BMI = 15.0–19.9)	5	5.6	11	8.0	16	7.0
Normal (BMI = 20.0–24.9)	20	22.2	30	21.9	50	22.0
Overweight (BMI = 25.0–29.9)	37	41.1	38	27.7	75	33.0
Obese (BMI = 30.0–39.9)	24	26.7	48	35.0	72	31.7
Morbidly obese (BMI ≥ 40.0)	4	4.4	10	7.3	14	6.2
Total	90	100.0	137	100.0	227	100.0

problem in the area and a major risk factor, was mentioned by only 4.0% of attendees; 15% of attendees mentioned two or more of the causes. Of the 227 attendees, the main preventive measures mentioned were weight reduction (19.8%), cessation of smoking (18.1%) and exercise (11.0%). Control of hypertension and DM were mentioned by less than 6.0% of attendees (5.7% and 1.3% respectively), while about 15.0% mentioned two or more preventive measures. There was no significant difference in knowledge of causes and preventive measures between males and females. When knowledge of causes and prevention of CHD were stratified by age (< 20 years, 20–34 years, 35–49 years, ≥ 50 years), no statistically significant association was found.

Table 3 shows knowledge of causes and prevention of CHD by education level (illiterate compared with educated). There was a highly statistically significant association between knowledge and education status of attendees. This association was also apparent when knowledge of causes

Table 3 **Knowledge of causes of coronary heart disease (CHD) and preventive measures among attendees by education**

Knowledge	Illiterate No.	%	Educated No.	%	Total No.	%	*P*-value (χ^2 test)
Causes of CHD							
Yes	26	28.0	67	72.0	93	100.0	< 0.001
No	70	52.2	64	47.8	134	100.0	
Preventive measures							
Yes	24	26.4	67	73.6	91	100.0	< 0.001
No	72	52.9	64	47.1	136	100.0	

and prevention were analysed adjusting for sex. Knowledge of causes and prevention of CHD increased with an increasing level of education.

Discussion

The high prevalence rate of DM and smoking in our study are consistent with a study in Medina which showed that DM and cigarette smoking were significantly more frequent in cases than controls [*7*]. Similar results were reported in a study of 264 cases of acute myocardial infarction in the Eastern Province of Saudi Arabia which showed that smoking was prevalent in 57%, prior CHD history in 41%, DM in 28% and hypertension in 27% [*5*]. Analysis of 100 patients admitted with acute myocardial infarction in Gizan, Saudi Arabia also showed that the common risk factors were smoking (73%), hypertension (16%) and DM (15%) [*6*].

DM has been reported to be a common disease in Saudi Arabia, with prevalence rates ranging from 1.4% to 30.0% [*9–13*]. The high prevalence of DM in males is consistent with the study by El-Hazmi in Riyadh [*13*] and with the national survey in the Eastern Province of Saudi Arabia [*16*]. However, the high prevalence of DM in our study might be due to a real increase in the disease in this community or to overrepresentation of attendees with chronic diseases. A further study of a large sample might be needed to clarify this.

The prevalence of hypertension in our study is consistent with the study by Abu-Aisha et al. which showed a prevalence rate of 4.1% and a borderline hypertension rate of 5.0% [*20*]. Other studies have shown a high prevalence of hypertension ranging from 11.1% [*21*] to 15.25% [*22*]. However, the prevalence rates for Saudi Arabia are low compared with American rates [*23,24*]. The increased prevalence of hypertension with age is consistent with other studies [*20,21*].

The prevalence of smoking in this study was also high. Taha et al. [*14*], in their study of the smoking habits of 2264 male students at King Saud University in Riyadh, found that 37% of the students smoked and over half of them smoked more than 15 cigarettes per day. A study in Jordan [*25*] showed that in a sample of 2103 students, the prevalence of smoking was 16%, and in a sample of 1386 non-students, the prevalence of smoking was 50%. Although in Saudi society smoking among females is not socially acceptable, the absence of smoking in females in this study might be due to underreporting.

The high prevalence of obesity, especially among females, is consistent with several studies in Saudi Arabia. The national survey showed an overall prevalence of obesity of 16% among males and 24% among females, with a prevalence of 23% and 30% among males and females respectively in the Eastern Province [*16*]. A study of 1000 cases of DM in Riyadh showed that 60.8% of female diabetics were obese [*26*]. In a case–control study conducted at King Saud University Hospital in Riyadh, the mean BMI for diabetic patients (27.1 ± 12.1 kg/m^2) was significantly higher than that for controls (24.7 ± 4.7 kg/m^2) [*15*]. In a study of 300 diabetic Saudi women in the Eastern Province of Saudi Arabia, 57.0% were found to be obese (BMI ≥ 30 kg/m^2) [*27*]. In the WHO MONICA project [*28*], BMI > 30.0 kg/m^2 was found in more than 10% of people. To our knowledge, there have been no studies on physical activity and heart disease in Saudi Arabia. Our study showed a high prevalence of leisure time physical inactivity. Further studies, of large samples, are needed to estimate the true prevalence of physical inactivity.

This study reflects the poor knowledge of attendees about CHD. The study also showed that education was a determining factor in the acquisition of knowledge. The fact that educated males had better knowledge of CHD than educated females might be due to lack of access to health information for females. Poor knowledge also reflects inadequate health education given by primary health care services and by the mass media. The study results were consistent with the statements of the SWT centre health team that lack of health awareness is one of the main health-related problems in the community.

The high prevalence of DM, obesity, hypertension and lack of exercise in this study calls for an action plan by the primary health care team to prevent and control these risk factors. More effort is needed by the health team of the centre to improve attendees' knowledge and promote healthy attitudes and behaviour. The latter poses a greater challenge. Furthermore, the primary health care team should be concerned with early detection and treatment of DM, hypertension, obesity and other CHD risk factors. Health committees could participate in health education programmes to reduce illiteracy and improve knowledge and attitude of the attendees. These efforts should be supplemented with community-wide education programmes aimed at schools and homes. Structured health education programmes for prevalent health problems should include ones in CHD. The help of experts in CHD should also be sought.

Acknowledgements

We would like to express our thanks to the Director of the South-west Thogbah primary health care centre and all doctors, nursing staff and other members of the health team for their help and support in conducting this study.

References

1. Dawber TR. *The Framingham Study: the epidemiology of atherosclerotic disease.* Cambridge, Massachusetts, Harvard University Press, 1990.
2. Multiple risk factor intervention trial. Risk factor changes and mortality results. Multiple Risk Factor Intervention Trial Research Group. *Journal of the American Medical Association*, 1982, 248:1465–77.
3. Semenciw RM et al. Major risk factors for cardiovascular disease mortality in adults: results from the Nutrition Canada Survey cohort. *International journal of epidemiology*, 1988, 17:317–24.
4. Sebai ZA. *Health in Saudi Arabia*, Vol. 2. Riyadh, Directorate of Scientific Research, King Abdul Aziz City for Science and Technology, 1987:81–126.
5. Al-Gindan YM et al. Acute myocardial infarction in the Eastern Province of Saudi Arabia: retrospective analysis of 264 patients. *Annals of Saudi medicine*, 1990, 10:129–36.
6. Hakim JG et al. Acute myocardial infarction in a region of Saudi Arabia—the Gizan experience. *Saudi medical journal*, 1991, 12:392–6.
7. Ahmed AF et al. A case–control study of coronary heart disease risk factors in Saudis at Al-Madina Al-Mounawarah. *Saudi medical journal*, 1993, 14:146–51.
8. Alobaid AA, Gilchrist R, Bointon B. Coronary heart disease mortality in the Eastern Province of Saudi Arabia in 1989 and 1990. *Annals of Saudi medicine*, 1994, 14:387–91.

9. Bacchus RA et al. The prevalence of diabetes mellitus in male Saudi Arabs. *Diabetologica*, 1982, 23:330–2.

10. Abu-Zeid HAH, Al-Kassab ASK. Prevalence and health care features of hyperglycemia in semi-urban/rural communities in southern Saudi Arabia. *Diabetes care*, 1982, 15:484–9.

11. Fatani HH, Mira SA, Al-Zubair AG. Prevalence of diabetes mellitus in rural Saudi Arabia. *Diabetes care*, 1987, 10:180–3.

12. El-Hazmi MAF, Warsy AS. A comparative study of hyperglycemia in different regions of Saudi Arabia. *Annals of Saudi medicine*, 1989, 9:435–8.

13. El-Hazmi MAF et al. The prevalence of diabetes mellitus and impaired glucose tolerance in the population of Riyadh. *Annals of Saudi medicine*, 1995, 15:598–601.

14. Taha A et al. Smoking habits of King Saud University students in Riyadh. *Annals of Saudi medicine*, 1991, 11:141–3.

15. Anokute CC. Epidemiology of diabetes mellitus in Saudi Arabia—retrospective study of 210 cases. *Practical diabetes digest*, 1991, 3:25–6.

16. Al-Nuaim AR et al. *National Chronic Metabolic Diseases Survey. Part 1. Prevalence of diabetes mellitus, obesity and hypercholesterolemia in Saudi Arabia*. Riyadh, Ministry of Health and King Saud University, 1995.

17. Daniel WW. *Biostatistics: a foundation for analysis in the health sciences*, 4th ed. Singapore, John Wiley and Sons, 1987:155.

18. Hutchison JC. *Hypertension: a practitioner's guide to therapy*. New York, Medical Examination Publishing Company Inc., 1975:226–30.

19. *FAMCO field project in Al-Thoqba area, Al-Khobar*. Dammam, Saudi Arabia, King Faisal University, College of Medicine and Medical Sciences, 1988:26–30.

20. Abu-Aisha H et al. The epidemiology of hypertension in a rural community in central Saudi Arabia. In: Smith SR, ed. *Hypertension: current concepts and management*. Riyadh, Ministry of Interior, 1985:111.

21. Abolfotouh MA et al. Prevalence of hypertension in south-western Saudi Arabia. *Eastern Mediterranean health journal*, 1996, 2(2):211–8.

22. Nazimuddin K. Prevalence of hypertension in Saudi Arabia. *Practitioner*, East Mediterranean edition, 1994, 5(11):805–6.

23. Burt VL et al. Prevalence of hypertension in the US adult population. Results from the Third National Health and Nutrition Examination Survey, 1988–1991. *Hypertension*, 1995, 25:305–13.

24. Haffner S et al. Prevalence of hypertension in Mexico City and San Antonio, Texas. *Circulation*, 1994, 90:1542–9.

25. Awidi AS. Patterns of cigarette smoking in Jordan: a study of the greater Amman area. *Annals of Saudi medicine*, 1991, 11:144–7.

26. Famuyiwa OO et al. Diabetes mellitus in Saudi Arabia: the clinical pattern and complications in 1000 patients. *Annals of Saudi medicine*, 1992, 12:140–51.

27. Binhemd TA. Diabetes mellitus: knowledge, attitude, practice and their relation to diabetes control in female diabetics. *Annals of Saudi medicine*, 1992, 12:247–51.

28. Keil U, Kuulasmaa K. WHO MONICA Project: risk factors. *International journal of epidemiology*, 1989, 18 (suppl.1): S46–55.