# Prevalence of Self-reported Cardiovascular Risk Factors among Saudi Physicians: A Comparative Study

**Ibrahim Al Alwan, MD, [1] Motasim Badri, PhD, [1] Maram Al-Ghamdi, [2] Alanoud Aljarbou, [2] Hessa Alotaibi, [3] Hani Tamim, PhD [1]**
College of Medicine, King Saud bin Abdulaziz University for Health Sciences, [1] King Abdullah International Medical Research Centre, [2] King Khalid University Hospital, Riyadh [3]

**Abstract:**

**Background:** Cardiovascular disease (CVD) is a leading cause of death worldwide. CVD-related mortality can be substantially reduced by modifying risk factors.

**Methods:** In this cross-sectional study conducted in King Abdulaziz Medical City, Riyadh, we estimated and compared prevalence of self-reported risk factors for CVD among physicians and a comparative group of non-physician health workers. We postulated that prevalence of CVD risk factors would be significantly lower in physicians. Participants filled in a structured self-administered questionnaire on CVD risk factors.

**Results:** The study included 200 participants (100 respondents each group). Participants in the two groups were of similar age ($P$ = 0.46) and Body Mass Index (BMI) $P$ = 0.11. There was no statistical difference in smoking, frequency and length of physical exercise per week ($P$ = 0.53, 0.57, 0.47 respectively). Diet habits showed daily intake of more protein, less fat and highly processed food, and similar vegetables, fruit and carbohydrate among physicians. Health status (presence of hypertension, diabetes, or dyslipidemia, or other diseases) didn't differ between the two groups. Physicians showed a significantly higher familial cardiovascular risk, with mothers and siblings having more dyslipidemia, but there was no significant difference in parental dyslipidemia, diabetes or hypertension.

**Conclusion:** These findings indicate that high awareness of CVD and associated risk factors alone is not enough to prevent their occurrence. Programs to routinely screen these risk factors and improve the lifestyle of physicians are needed.

**Keywords:**
Cardiovascular disease, risk factors, physicians, Saudi Arabia

**Short title: CVD risk factors Among Saudi Physicians**

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**Correspondence:**
**Al-Alwan IA**
College of Medicine,
King Saud bin Abdulaziz University for Health Sciences
PO Box 22490, Riyadh 11426,
Kingdom of Saudi Arabia
Tel: +966 (1) 2520088 Ext. 51112
Fax: +966 (1) 2520088 Ext. 51119
E-mail: alwanmed@hotmail.com

## 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 ischaemic attack, or the development of congestive heart failure or peripheral vascular disease. [1] 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. [1-4]

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. [1, 5-7] Many of the important risk factors for cardiovascular disease are preventable through the reduction of behavioral risk factors and other specific measures focused mainly on identifying and treating individuals with increased CVD risk to prevent heart attacks and stroke.

Many major prospective studies have documented prevalence of CVD risk factors and their synergistic effect on developing CVD. [8-12] In developed countries, prevalence of some CVD risk factors has decreased while, in contrast, prevalence has markedly increased in developing countries. [13] It is estimated that CVD would be the leading cause of death by 2020 in the developing countries. Of death attributable to CVD disease, approximately 80% occur in low - and middle-income countries, often in people aged less than 60 years. [13]

The Kingdom of Saudi Arabia has experienced a major epidemiologic and nutritional transition in the last three decades. This is marked by economic growth, standard of living and life-style transformation, including a more sedentary lifestyle and access to higher energy-dense diet intake, and increased urbanization. This transition has led to the emergence of the epidemic of non-communicable diseases and large increases in morbidity and mortality attributable to CVD. Several local studies have shown increased prevalence of diabetes mellitus (DM), smoking, obesity and hypercholesterolemia. [14-26] In a study conducted in the Eastern Province of the Kingdom, it was estimated that CVD conditions accounted for more than 26% of total death. [18]

However, it is unclear whether knowledge of CVD and associated risk factors would necessarily prevent their occurrence. We therefore conducted this study to estimate and compare the prevalence of self-reported risk factors of CVD among physicians and a comparative group of non-physicians affiliated with King Abdulaziz Medical City, Riyadh, Saudi Arabia. Owing to their increased awareness and access to information on disease frequency and determinants, and health consequences of lifestyle changes, and need for early detection and treatment of diseases, we postulated that prevalence of CVD risk factors would be significantly lower in physicians.

## Methods

### Population and Sampling Technique

This cross-sectional study was conducted at King Abdulaziz Medical City (KAMC) in Riyadh, Kingdom of Saudi Arabia between July – August 2009. KAMC is a large tertiary referral center with more than 1200 physicians. Participants had to be above the age of 20 years.

From previous studies, the estimated prevalence rates of hypertension, DM, smoking and obesity in Saudi Arabia were 10%, 5%, 30% and 25% respectively (17-18, 21-23). Taking the average expected prevalence of these conditions (18%), the sample of participants was estimated at 191. Thus, a sample of 200 participants (100 physicians and a comparison group of 100 non-physicians health workers) affiliated with KAMC was randomly selected from the list of employed staff provided by the Human Resources Department of the hospital and were approached to participate in the study.

### Data Collection

Data were collected using a structured self-administered questionnaire. The components of the questionnaire were based on the WHO guidelines for noncommunicable diseases risk factors field surveys. [27] The questionnaire included demographic variables (age, sex, weight, height) and the presence of risk factors for CVD, (physical activity level, smoking,

family history and pre-existing medical conditions like diabetes mellitus, hypertension and hyperlipidemia). The dietary habits, physical activity and smoking status were evaluated using the WHO CVD-risk management package for low- and medium resource settings guidelines. [28] Dietary habits evaluation included the amount of daily consumption of proteins, carbohydrates, fats, vegetables and fruits, and physical included estimation of number of hours of exercise per week. Smoking status was evaluated according to history of smoking (current smoker, non-smoker and ex-smoker). Family history of CVD was confirmed according to the presence of diabetes mellitus, hypertension or hyperlipidemia in the immediate family members. No clinical examinations or biochemical tests were done. Two hundred questionnaires were distributed. The study was approved by the King Abdullah International Medical Research Center Ethics Research Board.

**Statistical analyses**

Categorical variables were summarized by calculating the number and percent, whereas the mean and standard deviation were calculated for continuous variables. Comparison of the two groups was done by using the Chi-square test for categorical variables, and the student's t-test for continuous ones. A p-value ≤ 0.05 was considered to be statistically significant. SPSS (version 17) was used for data cleaning, management, and analyses.

**Results**

The study included 200 participants; 50% of these were physicians and the rest were non-physicians. The non-physicians group included 73 nurses, 21 lab technicians and 6 radiologists. Details of demographic characteristics of participants are described in Table 1. Female represented 51% of the whole sample. Most participants were in the age group between 20-30 years. The physicians group showed more male predominance compared with the non-physicians; males accounted for 67% of the physicians and 31% of the non-physicians groups. BMI data showed a healthy mean of less than 25 kg/m$^2$ in the physicians group, and in the non-physician group was 25.6 kg/m$^2$. There was no statistical difference between the two groups in terms of age or BMI but gender distribution differs.

Lifestyle, diet habits and health status of study participants' data are presented in Table 2. There was no significant difference in relation to smoking, exercise or length of exercise per week (p-value = 0.53, 0.57, 0.47 respectively). Prevalence of smoking in physicians and non-physicians was 12% and 17%, respectively. Thirty five percent of physicians exercised less than three hours per week, while 39% of non-physicians participated in less than three hours of exercise per week. In general, for both smoking and exercise, or length of the exercise per week, there was no significant statistical difference between the two groups. Physicians had daily uptake of more protein, less fat and highly processed food and similar vegetables, fruit or carbohydrate compared with non-physicians.

Health problems for the studied participants showed physicians had more prevalence of hypertension, diabetes Type II and hyperlipidemia. Although the incidence compared with non-physicians was higher, there was no significant statistical difference between the two groups; Table 2.

Details of family history are shown in Table 3. Family history showed significant difference in prevalence cardiovascular disease in the two groups. Mothers and siblings of physicians showed higher incidence of dyslipidemia. There was no significant difference in prevalence of diabetes or hypertension in physicians' families compared with non-physicians.

**Discussion**

To our knowledge this is the first study to demonstrate comparison of CVD risk factors between physicians and non-physicians in the Kingdom of Saudi Arabia. Although awareness of lifestyle disease is typically high among physicians, the findings of this study indicate that the prevalence of self-reported CVD-related modifiable risk factors among physicians was not significantly different from that of their healthcare professionals' counterparts. Data presented in this study showed no significant difference between physicians and non-physicians in lifestyle, dietary habits or presence of hypertension, diabetes or hyperlipidemia disease. Forty percent of the physicians included in this study

do not exercise regularly and those who exercise 60% of them exercise for less than 3 hours per week. Furthermore, 51% and 68% rarely consume vegetables and fruits, and regular intake of protein, fat food and highly processed food was 77%, 33% and 18% respectively. Physicians showed significantly higher familial cardiovascular risk, with mothers and siblings having more dyslipidemia, however this maybe due to better awareness and early detection of these medical conditions in their families. These findings indicate that increased awareness of CVD and associated risk factors alone is not enough to minimize their occurrence. This has significant implications for addressing the growing pandemic of CVD disease and related complications.

The prevalence of hypertension (8%), diabetes (2%) and hyperlipidemia (8%) disease calculated for physicians in this study is significantly lower than that calculated in studies reporting CVD risk factors among the general population of the Kingdom of Saudi Arabia. [17-26] However, this may be explained by the young age of the physicians we studied (82% were younger than 40 years). In a study of persons attending a primary health care centre, the CVD prevalent risk factors were diabetes mellitus (28.2%), obesity (37.9%) and lack of physical exercise (68.3%) (29). A study by Mansour *et al*. in 2007, reported a hypertension prevalence of 26%, with the highest prevalence of hypertension (30%) calculated for illiterate individuals, and the lowest in those with higher education (20%). [30] However, 66.9% of hypertensive patients in that study who denied history of having hypertension were actually found to be hypertensive. This reflects the proportion of undiagnosed hypertension in our setting. A study from India suggests that, even among physicians, this proportion could be as high as 71%. [31]

A large study from India that included 2499 young physicians with similar age composition of the cohort of physicians we studied, documented a high prevalence of cardio-metabolic risk factors; 35.6% and 13.3% had hypertension and diabetes respectively, and 61% had a BMI >25 kg/m$^2$. [31] Compared with the general Indian population, they had higher prevalence of hypertension, impaired glucose tolerance, abdominal adiposity and dyslipidemia. [32] However these higher prevalence estimates reported among the Indian physicians might be explained by the facts that diagnosis of these conditions in the Indian study was based on the aggressive biochemical tests and comprehensive medical examinations which were not done in our study. In addition, hypertension is high in the general population in India; amounting to a rather striking estimate of 54.5%. [32] Reported rates of hypertension in the Gulf region ranged 6.6%-33.6%. [33] Globally, it is expected that by the year 2025, approximately 1 in 3 adults aged over 20 years will have hypertension. [13]

Diabetes is a major risk factor of CVD. Individuals with type 1 or type 2 diabetes have two to three folds increased risk of cardiovascular events. Several studies conducted in the Kingdom of Saudi Arabia have shown that diabetes mellitus is a common disease. [20, 22, 24-26] The prevalence of diabetes mellitus (4%) reported among physicians in this study is within the range (1.4% to 30.0%) reported in these studies. In addition the estimated hyperlipidemia prevalence of 13% among physicians in this study is significantly lower than the rate calculated among the Saudi population. [34] In general, prevalence of low HDL-cholesterol and high level triglyceride is most common CVD risk factor in the Kingdom. [36] Extremely high rates of approximately 90% have been reported both among adults and children. [34-35] It has been argued that this could be possibly due to genetic and epigenetic factors. [34] Heritability of metabolic syndrome components, such as higher BMI, Lower HDL-C, obesity and insulin resistance has been reported among populations in the Arab Peninsula region. [36] However efforts aimed at identification and treating the exponentially growing cases of low-HDL are lacking. [34]

We observed a low intake of fruit and vegetables and high intake of protein among physicians in this study. Increased fruit and vegetable intakes have been recommended to prevent morbidity and mortality from CVD. [37-41] It has been argued that individuals consuming fruit and vegetables frequently are likely to practice healthy habits, such as, regular exercise, consume a low dietary intake of cholesterol and saturated fat and more likely to be non-smokers. [41] It has been shown that individuals with lower intakes of animal products and higher intakes of fruits and

vegetables have lower prevalence of CVD than populations with higher intakes of animal products. [42] Observational epidemiologic studies have suggested that dietary nutrients such as potassium, antioxidants, and folic acid abundant in fruit and vegetables are associated with a lower incidence of and mortality from cardiovascular disease. [37-41] The American Heart Association and other international agencies recommend a diet that includes ≥5 servings of fruit and vegetables daily. [43] A large prospective study from the United States assessing fruit and vegetables intake among female health professionals with no previous history of CVD reported mean daily total servings of fruits and vegetables intake of 6.1. [41] High intake of fruits and vegetables in that study was associated with significant reduction in CVD risk.

The observation that 40% of the physicians included in this study do not exercise regularly is comparable to the prevalence rates of physical inactivity (43.3%–99.5%) among Saudi children and adults documented in previous studies. [44] These reported estimates of inactivity are higher than rates reported in many industrialized countries of Europe and America. Low levels of physical activity and sedentary living are major contributors to the exponentially growing pandemic of non-communicable diseases in this region. [45-52] It was observed that individuals who lead a sedentary life have 20% to 30% increased risk of all-cause mortality compared to those who engage in at least 30 minutes of moderate intensity physical activity most days of the week. In adults, participation in 150 minutes of moderate physical activity each week (or equivalent) is estimated to reduce the risk of ischaemic heart disease by approximately 30% and the risk of diabetes by 27%. [53-54] The WHO recommendations emphasize the need to promote the concept of physical activity among various segments of the population. [55] Such programmes are of particular importance for changing the prevailing misconceptions and attitudes among the Saudi population. Khattab et al., have shown that few people with high dietary fat intake, obesity or physical inactivity visiting a family practice clinic perceived their behaviour as harmful. [56] Therefore comprehensive community-based interventions to achieve population-wide changes are needed. Such interventions should incorporate partnership with local healthcare and community organizations and providing healthcare for those at high cardiovascular risk. A similar intervention that was implemented in Finland between 1972 and 1995 achieved an impressive 72% reduction in coronary heart disease mortality rate. [57]

Studies conducted among physicians from developing countries show low levels of good healthcare habits and practices, [58-59] contrary to their counterparts in the United Sates who were observed to have very good health habits compared with the general American population. [60] A Study from the United States suggests that physicians adhering to healthy lifestyle practices are more effective in motivating patients to follow these practices. [60]

We acknowledge the limitations of the hospital-based design of this study and lack of formal biochemical tests. Therefore, there may be some existing diseases that were not captured, and consequently the true prevalence of CVD risk factors might have been under-estimated. In addition, the comparison group we modelled as baseline risk group might not represent the larger Saudi background population as they share many work environment conditions with physicians. The prevalence estimates of the CVD risk factors calculate for this group might be markedly different from the true estimates in the Saudi population. Our estimates are based on a self-administered questionnaire. The potential of recall bias and misclassification cannot be excluded.

## Conclusion

We have shown that prevalence of modifiable CVD risk factors among physicians and non-physicians was not significantly different. This indicates that high awareness of CVD and associated risk factors alone is not enough to prevent their occurrence. Programs to routinely screen these risk factors and improve the lifestyle of physicians should be implemented.

**Table (1). Comparison of demographic and anthropometric characteristics of the physicians and non-physicians groups.**

| Characteristic | Non-Physicians | Physicians | P-value |
|---|---|---|---|
| **Age** | | | **0.46** |
| 20-30 | 48 (48.0%) | 54 (54.0%) | |
| 31-40 | 34 (34.0%) | 27 (27.0%) | |
| 41-50 | 11 (11.0%) | 15 (15.0%) | |
| >50 | 7 (7.0%) | 4 (4.0%) | |
| **Gender** | | | **<0.0001** |
| Male | 31 (31.0%) | 67 (67.0%) | |
| Female | 69 (69.0%) | 33 (33.0%) | |
| **BMI**(kg/m$^2$), Mean (S.D) | 24.7 (4.2) | 25.6 (4.1) | **0.11** |
| **Overweight** | | | |
| Yes | 39(39) | 47(47) | **0.25** |
| No | 61(61) | 53(53) | |
| **Obesity** | | | **0.44** |
| Yes | 14(14) | 18(18) | |
| No | 86(86) | 82(82) | |

P: P-value; $\chi^2$ test for categorical data, t-test for continuous data.

**Table (2). Comparison of lifestyle, diet habits and health status of the physicians and non-physicians groups.**

| Characteristic | | Non-Physicians | Physicians | *P* |
|---|---|---|---|---|
| **Smoker** | Yes | 17 (17.0%) | 12 (12.0%) | 0.53 |
| | No | 78 (78.0%) | 81 (81.0%) | |
| | Ex-smoker | 5 (5.0%) | 7 (7.0%) | |
| **Exercise** | Yes | 55 (55.0%) | 59 (59.0%) | 0.57 |
| | No | 45 (45.0%) | 41 (41.0%) | |
| **Length of exercise per week** | <3hours | 39 (70.9%) | 35 (60.3%) | 0.47 |
| | 3-6hours | 11 (20.0%) | 17 (29.3%) | |
| | >6hours | 5 (9.1%) | 6 (10.3%) | |
| **Vegetables intake** | Rarely | 45 (45.0%) | 51 (51.5%) | 0.65 |
| | Usually | 43 (43.0%) | 37 (37.4%) | |
| | Always | 12 (12.0%) | 11 (11.1%) | |
| **Fruit intake** | Rarely | 63 (63.0%) | 68 (68.0%) | 0.29 |
| | Usually | 26 (26.0%) | 27 (27.0%) | |
| | Always | 11 (11.0%) | 5 (5.0%) | |
| **Carbohydrates intake** | Rarely | 27 (27.0%) | 20 (20.0%) | 0.50 |
| | Usually | 43 (43.0%) | 48 (48.0%) | |
| | Always | 30 (30.0%) | 32 (32.0%) | |
| **Proteins intake** | Rarely | 15 (15.0%) | 23 (23.0%) | 0.04 |
| | Usually | 55 (55.0%) | 61 (61.0%) | |
| | Always | 30 (30.0%) | 16 (16.0%) | |
| **Fat intake** | Rarely | 48 (48.0%) | 67 (67.7%) | 0.01 |
| | Usually | 43 (43.0%) | 24 (24.2%) | |
| | Always | 9 (9.0%) | 8 (8.1%) | |
| **Highly processed food intake** | Rarely | 45 (45.0%) | 72 (72.0%) | 0.0002 |
| | Usually | 36 (36.0%) | 14 (14.0%) | |
| | Always | 19 (19.0%) | 14 (14.0%) | |
| **Presence of any medical problem** | Yes | 23 (23.0%) | 28 (28.0%) | 0.42 |
| | No | 77 (77.0%) | 72 (72.0%) | |
| **Hypertension** | Yes | 8 (8.0%) | 9 (9.0%) | 0.80 |
| | No | 92 (92.0%) | 91 (91.0%) | |
| **Diabetes** | Yes | 2 (2.0%) | 4 (4.0%) | 0.41 |
| | No | 98 (98.0%) | 96 (96.0%) | |
| **Hyperlipidemia** | Yes | 8 (8.0%) | 13 (13.0%) | 0.25 |
| | No | 92 (92.0%) | 87 (87.0%) | |
| **Other CVD risk factors** | Yes | 10 (10.0%) | 9 (9.0%) | 0.81 |
| | No | 90 (90.0%) | 91 (91.0%) | |

**Table (3). Family history of CVD risk factors in the physicians and non-physicians groups.**

| Variable | | Non-Physicians | Physicians | *P* |
|---|---|---|---|---|
| **Family history of cardiovascular diseases** | Yes | 45 (45.0%) | 68 (68.0%) | <0.001 |
| | No | 55 (55.0%) | 32 (32.0%) | |
| **Family history of hypertension** | | | | |
| Father | Yes | 34 (34.0%) | 35 (35.0%) | 0.88 |
| | No | 66 (66.0%) | 65 (65.0%) | |
| Mother | Yes | 24 (24.0%) | 27 (27.0%) | 0.63 |
| | No | 76 (76.0%) | 73 (73.0%) | |
| Sibling | Yes | 5 (5.0%) | 4 (4.0%) | 0.73 |
| | No | 95 (95.0%) | 96 (96.0%) | |
| **Family history of diabetes** | | | | |
| Father | Yes | 23 (23.0%) | 31 (31.0%) | 0.20 |
| | No | 77 (77.0%) | 69 (69.0%) | |
| Mother | Yes | 16 (16.0%) | 27 (27.0%) | 0.06 |
| | No | 84 (84.0%) | 73 (73.0%) | |
| Sibling | Yes | 2 (2.0%) | 5 (5.0%) | 0.25 |
| | No | 98 (98.0%) | 95 (95.0%) | |
| **Family history of hyperlipidemia** | | | | |
| Father | Yes | 16 (16.0%) | 21 (21.0%) | 0.36 |
| | No | 84 (84.0%) | 79 (79.0%) | |
| Mother | Yes | 9 (9.0%) | 26 (26.0%) | 0.0016 |
| | No | 91 (91.0%) | 74 (74.0%) | |
| Sibling | Yes | 1 (1.0%) | 7 (9.5%) | 0.0084 |
| | No | 99 (99.0%) | 67 (90.5%) | |

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