



## Prevalence of Risk Factors of Essential Hypertension among Saudis in Riyadh City

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### ABSTRACT

**Background and Objectives:** Hypertension may be primary (also called essential), or secondary. The exact causes of primary or essential hypertension are not known, however, several risk factors may play a role, such as smoking, too much salt in the diet, and lack of physical activities. Lifestyle factors are critical determinants of blood pressure levels. This study aims to assess the prevalence of hypertension risk factors among Saudi Citizens in Riyadh City. **Material and Methods:** This is a cross-sectional study, in which questionnaires were used as the assessment tool for data collection. The data collection segments included socio-demographic data, the knowledge and attitude of lifestyle for hypertension, such as dietary factors, smoking, and physical activities. Various statistical analyses including frequency, percentile, and chi-square were applied, to assess the relationship and relative association between lifestyle and hypertension. **Results:** A total of 934 subjects responded, 13.6% of them were hypertensive and 75.2% were not hypertensive and 11.2% do not know if they were hypertensive or not. Despite the knowledge that 77.0% knew that smoking is a risk factor for hypertension, 22.5% of the males and 2.1% of the females still smoke daily. Data showed that 84.4% thought that, eating salty food was a risk factor for the development of hypertension, whereas 60.2% thought that eating fatty food was a risk factor for the development of hypertension. About 35.0% and 20.9% thought of eating vegetables and fruits respectively, as preventive measures against the development of hypertension, 16.6% and 23.1% of the subjects used to consume vegetables and fruits daily as recommended, 3.5% and 2.0% do not take salty and fatty food items respectively. Almost a fifth (19.7%) of all subjects from both sexes practiced exercise regularly, males do practice more regularly than females (25.1% versus 14.5%), Hypertensive subjects not practicing exercise were more than non-hypertensive subjects not practicing exercise (22.0% versus 13.7%). **Conclusion:** This study identified the determinants that significantly predicted the lifestyle risk factors for hypertension among Saudi Citizens, living in Riyadh city. It accentuates the need for increased health education, to quit smoking, having healthy food intake, and practice exercises regularly or having an active life.

**Keywords:** Hypertension, Lifestyle, Knowledge, Attitude. Risk factors, Saudi

### INTRODUCTION

Hypertension (HTN) may be classified into primary and secondary. Primary HTN or essential HTN has no clear cause and is linked to different risk factors such as genetics, obesity, poor diet, smoking, and lack of exercise, While Secondary Hypertension has a known cause [1]. Hypertension is a serious medical condition that significantly increases the risks of heart, brain, kidney, and other diseases. It is a major cause of premature death worldwide [2]. Approximately 1 in 4 men and 1 in 5 women have hypertension, World Health Organization (WHO), considered hypertension as one of the global targets for non-communicable diseases which are to be reduced by 25% by the year 2025, baseline 2010 [3]. Primary hypertension accounts for 90%-95% of adult cases, and secondary hypertension accounts for 2%-10% of cases [4].

The common risk factors for hypertension are modifiable risk factors such as physical inactivity, consumption of tobacco and alcohol, unhealthy diets (excessive salt consumption, a diet high in saturated fat and trans fats, low intake of fruits and vegetables), and being overweight or obese [5]. Non-modifiable risk factors include a family history of hypertension, age over 65 years, and co-existing diseases such as diabetes or kidney disease. Lifestyle factors are critical determinants of blood pressure levels operating against a background of genetic susceptibility [3].

Smoking is one of the risk factors for HTN. Although, smoking among university students is a social and public health problem worldwide. There is a high prevalence of smoking in Saudi Arabia. The majority of non-smoking Saudis are most likely due to beliefs (e.g., religious prohibition of smoking). There was a significant positive correlation between government policy and changes in male university students' smoking behavior [6].

There were significant positive correlations between hypertension and unhealthy diets especially salty and fatty food intake [2]. A cross-sectional study reported that the majority of Saudi students are aware of the benefits of vegetables and fruits, yet most of them consume less than the recommended intake of vegetables and fruits [7]. Dietary strategies to increase fruit and vegetable intake could lead to effective control of HTN in salt-sensitive subjects [8]. Saudi Ministry of Health published the Saudi dietary guidelines, that urges people to avoid salty and fatty foods including the reduction of the intake of a fatty and salty food item, also the guidelines encourage taking vegetables and fruits on daily basis [9].

There is a high level of physical inactivity in various regions and population groups in the Kingdom of Saudi Arabia. Population interventions are greatly needed, to promote physical activity [10]. To promote active life especially in the Kingdom of Saudi Arabia, possible barriers to physical activities must be identified and eliminated or overcome, such as lack of suitable places or exercise, high-density traffic, and low air quality [11].

The incidence and prevalence of primary hypertension are still rising worldwide, despite massive improvements achieved in primary and secondary prevention, further increases are still foreseen if no effective counteractions are undertaken [1]. Lifestyle modification is a suitable primary therapy for patients with mild hypertension, suitable adjunct to pharmacologic therapy may prevent an increase in blood pressure and the development of hypertension in people at risk, and such changes may apply to population-based interventions, opined that provision of guidance to the population relating to lifestyle practices is the only way that can help prevent and control hypertension [3,12,13].

## MATERIAL AND METHODS

This cross-sectional study was carried out from February to June 2020 to determine the prevalence of risk factors of essential hypertension among Saudis in Riyadh City. The study was conducted in the city of Riyadh the capital of Saudi Arabia and the largest city on the Arabian Peninsula. The study population includes Saudis who have lived in Riyadh City for more than 3 years, age 12 years and above of both males and females. The study was carried out at multi centers and sites in Riyadh city in the Kingdom of Saudi Arabia. Data was collected using a structured interviewer-guided questionnaire with questions on sex, age group, the risk factor of hypertension such as smoking, lack of exercise, and dietary habits. A cover note was provided explaining the objectives of this study, it was purely voluntary, and participants were free to withdraw from it at any point. There were attached documents illustrating the Recommended Dietary Allowance (RDA) especially for vegetables, salt, fruits, and fats were introduced to the subjects before the interview, to know the RDA for specific food groups or food items [9]. Also, the recommended duration and intensity of exercise for each age group were explained in the attached documents.

Data were collected, entered, and analyzed using Statistical Package for the Social Sciences (SPSS) version 24. The statistical analyses included the percentage and number of each category, Chi-square was used. If  $p < 0.05$  the differences were considered significant.

### Ethical Approval

Ethical approval was sought and approved from King Fahad Medical City, Kingdom of Saudi Arabia to conduct the research (IRB Registration Number with KACST, KSA -H-01-R-012. Also IRB Registration Number with OHRPLNIH, USA IRB00010471.

**RESULTS**

A total of 1000 Saudi’s participants were selected for this study of which 934 responded (response rate=93.4%), consisting of 49.1% males and 51.0% females, the ages of participants include 12 years and above, 24.5% were students, 47.1% employees and 17.6% were housewives. Data showed that 58.5% of them their education levels were university or postgraduates, 25.4% were secondary educated, and 21.5% of them their education was intermediate or below (data not shown here).

Of the total subjects interviewed, 13.6% were hypertensive and 75.2% were non-hypertensive, 12.3% of subject aged 30-50 was hypertensive whereas 36.7% of those aged 51 years and above were hypertensives (Table 1).

**Table 1 The prevalence of hypertension according to age**

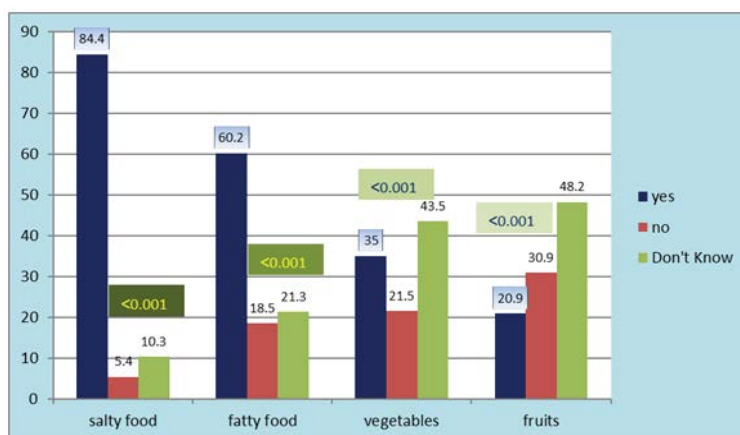
Age group	12-29 years	30-50 years	≥ 51 years	Total
Hypertensive% (Number)	2.5% (8)	12.3% (55)	36.7% (64)	13.6% (127)
Non hypertensive% (Number)	85.9% (268)	75% (336)	56.3% (98)	75.2% (702)
Do not know% (Number)	11.6% (36)	12.7% (57)	6.7% (12)	11.2% (105)

Almost three quarter (77.0%) thought that smoking is a risk factor for hypertension, 2.9% thought that it is not a risk factor. 22.5% of the males used to smoke daily, while 2.1% of the females used to smoke daily (data not shown here), 7.1% of the hypertensive subjects used to smoke daily, and 12.0% of non-hypertensive subjects used to smoke daily (Table 2).

**Table 2 Smoking and hypertension**

Smoking	Yes	Sometimes	No
Hypertensive% (Number)	7.1% (9)	4.7% (6)	88.2% (112)
Non hypertensive% (Number)	12% (84)	7.7% (54)	80.3% (564)
Do not know% (Number)	19.1% (20)	11.4% (12)	69.5% (73)

Data showed that 84.4% thought that, eating salty food was a risk factor for the development of hypertension, whereas 60.2% thought that eating fatty food was a risk factor for the development of hypertension. Only 35.0% and 20.9% know the relation between eating vegetables and fruits as preventive measures for the development of hypertension respectively (Figure 1). Only 16.6% and 23.1% of the subjects used to consume vegetables and fruits on a daily basis as recommended, only 3.5% and 2.0% were not taken salty and fatty food items (Figure 2).



**Figure 1 The risk factors of hypertension and dietary habits**

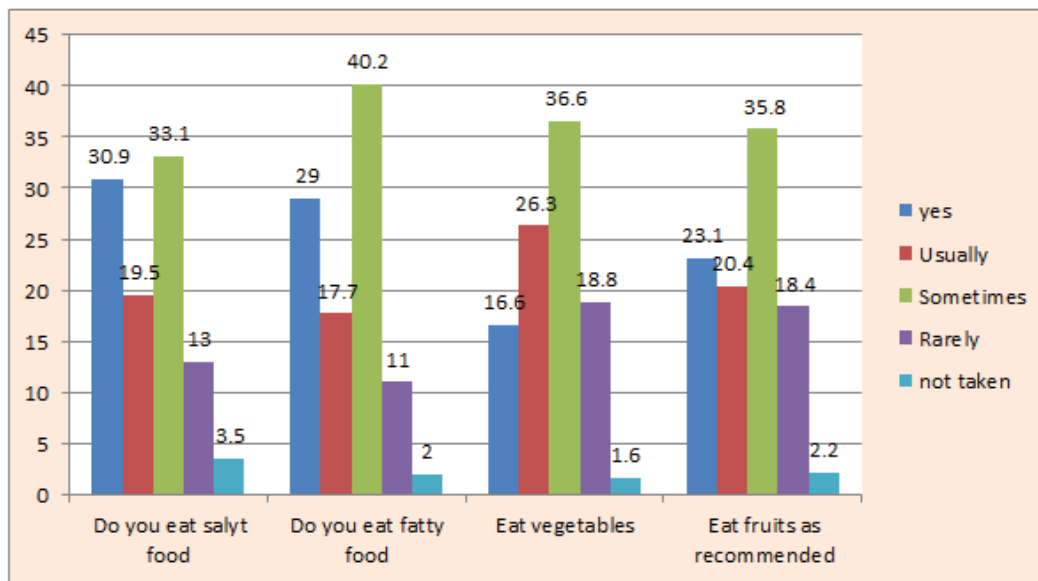


Figure 2 Dietary habits related to hypertension

Almost two-thirds (68.8%) thought that not practicing exercise or having a nonactive life is a risk factor for hypertension. Almost fifth (19.7%) of all subjects from both sexes used to practice regularly, males used to practice regularly more than females (25.1% versus 14.5%) (data not shown here). Hypertensive subjects (22.0%) not practicing exercises were more than non-hypertensive subjects (13.7%) not practicing exercise (Table 3).

Table 3 The relation between exercise and having hypertension

	Regular exercise% (No)	Sometimes% (No)	Not active% (No)	Total% (No)
Hypertensive	12.6 % (16)	65.4% (83)	22.0% (28)	13.6% (127)
Non hypertensive	21.5% (151)	64.9% (455)	13.7% (96)	75.2% (702)
Do not know	16.2% (17)	62.8% (66)	21.0% (22)	11.2% (105)
Total	19.7% (184)	65.0% (607)	15.3% (143)	100% (934)

### DISCUSSION

WHO estimated that one-fifth of the women and a quarter of men were hypertensive worldwide (WHO.,2020). Our study showed that 13.6% were hypertensive and 75.2% were not hypertensive, and 36.7% of those whose age is 51 years and above are hypertensive (Table 1). ALnozha, et al., reported a prevalence of hypertension among Saudi aged 30-70 years being 26.1%, and it was higher among males compared to females (28.6% versus 23.9%) [14].

Modifiable risk factors for cardiovascular diseases that are common among adults with hypertension include cigarette smoking and exposure to tobacco smoking. Active smoking was linked with hypertension [15]. Amongst US adults with hypertension between 2009 and 2012, 15.5% were current smokers [16]. The attitude of the correspondents in this study showed that 12.1% smoke on daily basis and 7.9% smoke sometimes and the males use to smoke more than the females (Table 2). The median prevalence of smoking in Saudi Arabia was 17.5% (ranging from 2.4%-52.3% and more common amongst males (26.5%), than females (1.0% to maximum 9.0%) [17]. In our study (Table 2) 77.0% agreed that smoking is a risk factor for hypertension. Smoking affecting arterial stiffness and wave reflection might have a greater detrimental effect on central blood pressure and are more likely to develop severe forms of hypertension, including malignant and renovascular hypertension [18].

Saudi males were significantly smoking more than the females with a prevalence of 18.7% and 7.3%, respectively [19]. The need for implementing lifestyle changes should be promoted both in the general population and among

healthcare professionals to improve women's health [20]. Smoking is a prevalent health problem among Saudis that requires intervention for eradication; smokers are more likely to develop CAD compared to non-smokers [19]. Regarding smoking as a risk factor, various strategies can be used to promote smoking cessation. Physicians are in an excellent position to help their patients stop smoking [21].

The appropriate lifestyle modifications to prevent and treat hypertension are to restrict dietary sodium and encourage consumption of diets that are rich in fruits, vegetables, dietary and soluble fiber [22]. In this study, 84.4% thought that eating salty food was a risk factor for the development of hypertension and about 35.0% of them knew the relation between eating vegetables as preventive measures for the development of hypertension (Figure 1). A three-week exclusive vegetarian diet results in reduced urinary sodium excretion and an increase in potassium excretion (an index of sodium and potassium intake), and resulting in reduced systolic blood pressure [8]. Education on hypertension should be intensified, and emphasis should be to follow dietary guidelines, to ensure reduction in hypertension risks, such as daily intake of vegetables, and low intake of salty and fatty food [2]. Our results demonstrated that 16.6% and 23.1% of the subjects used to consume vegetables and fruits daily as recommended (Figure 2). Greater long-term intake and increased intake of fruit and vegetables may reduce the risk of developing hypertension [23]. Vegetables and fruits are rich sources of fiber. Prospective cohort studies have shown inverse associations between fiber intake and cardiovascular diseases, possibly mediated by blood pressure [24].

Controlled trials in hypertensive patients, showed blood pressure lowering effects of diets rich in fruits and vegetables and low in saturated fats [25].

Our study showed that non-hypertensive patients used to practice exercise regularly more than hypertensive patients (Table 3). Regular physical activity causes positive effects on the cardiovascular system, including adaptive molecular and cellular reprogramming, that have a cardioprotective effect [26]. About 19.7% of the correspondents used to practice exercise regularly (Table 3), the levels of physical activity in Saudi society are insufficient to maintain good health, the majority of Saudi children, youth, and adults are not active enough to prevent cardiovascular and other diseases [27]. In our study (males used to practice regular exercise than females (25.1% *versus* 14.5%), The findings of Saudi national and sub-national studies indicated that the prevalence of physical inactivities ranged from 50% to 85% among males and 73% to 91% among females [27]. Aerobic exercise is almost completely free of secondary effects and also a useful adjunctive therapy in treating hypertension. There are several possible mechanisms to account for the beneficial effects of exercise in reducing blood pressure, thereby resulting in physiological effects usually being classified as acute, post-exercise, or chronic [28]. A high value was placed on the avoidance of cardiovascular morbidity and premature death caused by untreated hypertension. For sedentary people with hypertension, the options are to undertake or maintain regular physical activity, to use another lifestyle modification technique to commence or continue antihypertensive medication. The recommendation for patients with mild hypertension should be to engage in 50 minutes-60 minutes of moderate rhythmic exercise of the lower limbs, such as brisk walking or cycling, 3 or 4 times per week to reduce blood pressure [22,29]. The understanding of the mechanisms of exercise-induced cardiovascular protective effects is emerging for the prevention of essential hypertension to address poor dieting together with smoking and promoting at the same time physical activities [30].

## CONCLUSION

The prevalence of inactivity, smoking and eating an unhealthy diet, as risk factors for essential hypertension among Saudis, should be addressed. The awareness, prevention, and control programs of hypertension in the community should be increased, so that the Saudis could enjoy and maintain a healthy lifestyle, such as having an active life, eating healthy food by following the Saudi dietary guidelines, avoid active and passive smoking to prevent essential hypertension, and to reduce the complications of hypertension.

### Limitation of the Study

The study includes Saudi citizens in Riyadh City only, further study should include different regions of the Kingdom of Saudi Arabia.

## DECLARATIONS

### Conflicts of Interest

The authors declared no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

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### Ethical approval

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Approval Number Federal Wide Assurance NIH, USA: FWA00018774.

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