



# International Journal of Applied Sciences and Biotechnology

A Rapid Publishing Journal

**ISSN 2091-2609**

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**CODEN (Chemical Abstract Services, USA): IJASKD**

Vol-3(4) December, 2015

Available online at:

<http://www.ijasbt.org>

&

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Impact factor\*: **1.422**

Scientific Journal Impact factor#: **3.419**

Index Copernicus Value: **6.02**

IBI Factor 2015\*\*: **4.19**

\*Impact factor is issued by Universal Impact Factor. Kindly note that this is not the IF of Journal Citation Report (JCR).

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Research Article

## DIABETES MELLITUS, HYPERTENSION & ASSOCIATED FACTOR'S AMONG STUDENTS OF JAZAN IN THE KINGDOM OF SAUDI ARABIA

Yahya Hasan Hobani, Shiju Mathew\* and Hassan Ali Samsam

Department of Medical Lab Technology (Genetics Unit), College of Applied Medical Sciences, Jazan University, Jazan

\*Corresponding author email: sjohn@jazanu.edu.sa

### Abstract

**Background:** Health-related issues has been one of the major factor of concern for the death since the last three decades in Saudi Arabia which includes diabetes mellitus, hypertension and other associated factors are considered as major risk factors. The investigation on the prevalence of Diabetes, Hypertension and associated factors among students of Jazan, Saudi Arabia is an alarm for the hidden possible health threat among the students in the younger age. **Methods:** The study aimed to assess the prevalence of Diabetes, Hypertension and associated factors in fifty students of Jazan in Kingdom of Saudi Arabia. Data were collected through interview using a structured questionnaire followed by clinical examination. Clinical practice methods were followed to estimate Cholesterol, Body Mass Index (BMI), weight, Diabetes and Hypertension from the sample. **Results:** A high percentage of participants i.e. 70% are pre diabetes, which is partly due to a more sedentary lifestyle and smoking and weight gain. 62% of participants reported no physical exercise in daily life. Habit of smoking is present among 44% of the participants over weight and obesity showed as 24% and 16% respectively. The high blood pressure among the participants was 36% and 64% were prehypertensive. Obesity and weight assessed by using Body Mass Index. The result showed 52% among the participants were in normal weight, 24% were overweight and 16% were obese. **CONCLUSION:** The prevalence of Smoking, physical inactivity, obesity and cholesterol level were associated with the risk of Pre-hypertension, hypertension, pre-diabetics and diabetics.

**Keywords:** Diabetes; Hypertension; Obesity; Risk factor; Jazan region

### Introduction

Hypertension and Diabetes are the important public health concern given that it is highly prevalent, is a risk factor for congestive heart failure (Shapo *et al.*, 2003). Hypertension has appeared as an important cause of morbidity and mortality in several Middle East countries with an adult prevalence varying between 20.00% and 30.00% (Gordon, 2003).

The main threat factor for the increased of type 2 diabetes is obesity (Mokad *et al.*, 2000). Therefore, it is thought that the dramatic increase in the occurrence of end stage renal disease that has been observed over the past 20 years is attributable to the epidemic of type 2 diabetes that has observed to be more prevalent during this time. In present scenario, approximately 15.6 million Americans have diabetes, mostly type 2 diabetes (Gavin *et al.*, 1997; Alberti and Zimmet, 1998). Moreover 13.4 million have impaired with glucose tolerance, 7 and 50 million have hypertension.8 However, the prevalence of diabetes, hypertension, and obesity is significantly higher is observed in African-Americans than in whites, particularly in the South-eastern region of the US. In fact, the prevalence of hypertension cases in African-Americans is among the maximum in the world. According to the data of mortality

due to hypertensive disease has been implicated in 4.4% of deaths coded to diabetes, and diabetes cases was observed in 10% of deaths cases to hypertensive disease. Indeed, an approximate estimation is about 35% -75% of diabetic cardiovascular and renal problems can be ascribed to hypertension (Wolf-Maier, 2003).

Obesity, smoking and sedentary lifestyle have also been associated with cardiovascular disease (Bojar *et al.*, 2011). Interference studies have shown that lifestyle modification can decrease the incidence of diabetes mellitus (Gower, 1999) and decrease blood pressure (Pan *et al.*, 2001). The health related problems are very frequent in the youngster's and the early precautions and control measures will help to reduce the health issues hence, the need of the present study is to ensure the pervasiveness of health related problem in younger age among the students of Jazan, the major factors like Diabetes, Hypertension and Cholesterol. This investigation has provide information on the prevalence of Diabetes, Hypertension and associated factors among students of Jazan, Saudi Arabia and has introduced the possible health threat among the students in the younger age. The possible student's health risk can be accessed, which will help in the evaluation and control.

## Materials and Methods

### Sample

Fifty samples of students (male) were selected randomly from Jazan general Hospital and Aborish Hospital, Jazan. Criteria for inclusion in the study were being in the age group of 18-27 years, having Saudi nationality, Individuals who did not meet one or more of these criteria were excluded from the study. Ethically, this study was conducted in accordance with the ethical standards within the political borders of the Kingdom of Saudi Arabia. All participants, including who were involved in this study read, understood and signed a written consent form. The anonymity of participants was emphasized, and confidentiality was strictly maintained for all collected questionnaires.

### Data Collection

Students were interviewed privately face-to-face, by trained interviewers by using a pre-tested questionnaire. Initially, information on age, weight, height, Body Mass Index, Systolic and Diastolic BP, Blood sugar and Cholesterol data was collected. The consent of the persons have been taken before collecting the data & sample.

### Blood Pressure

Before measuring the blood pressure, students were initially made to rest for 15 minutes then asked about tea or coffee consumption, physical activity, smoking and a full bladder (which might elevate blood pressure). Blood pressure of the participants mercury-based sphygmomanometers using standard WHO criteria. Blood pressure was measured twice from the right arm with the student in the sitting position and the arm was placed at the heart level. There was at least a 30-second interval between the two measurements; thereafter the average of the two measurements was recorded as the individual's blood for cardiovascular disease and illustrated a high pressure. According to the WHO definition, the normal blood pressure is 120/80 mmHg, individuals with systolic blood pressure =140 mmHg or those with diastolic blood pressure = 90 mmHg were considered hypertensive, when the systolic pressure 120-139 and diastolic 80-89 this case was considered as pre-hypertension.

### Body Mass Index

Weight was measured while the subjects were minimally clothed without shoes using digital scales and recorded to the nearest 100 g. Height was measured in a standing position without shoes using a tape meter while the shoulders were in normal position. Body mass index was calculated as weight (kg) divided by height (m). To avoid subjective error, all measurements were done by the same investigator. According to the World Health Organization, overweight was defined as BMI 25–29.9 kg/m and obesity as BMI = 30 kg/m. Obesity and weight assessed by using

Body Mass Index of the participants and classified as Underweight < 18.5BMI, Normal weight 18.5- 24.9BMI Over Weight 25.0- 29.9BMI, Obese  $\geq$  30 BMI.

### Glucose Estimation

End point method for quantitative in vitro determination of Glucose in human serum with spectrophotometer was used in this study.

Enzymatic methods involving in the determination of glucose and the estimation has been shown in the Table 1. Serum sample collected by standard procedure stable for 7 days at -20 °C. The Assaying was done by using Crescent Diagnostic Kit, KSA for Glucose is used.

**Table 1:** Glucose Estimation by using enzymatic method

Pipette into cuvette	Blank	Standard	Test(sample)
Sample $\mu$ l	-	-	10
Standard $\mu$ l	-	10	-
D.W $\mu$ l	10	-	-
Working reagent $\mu$ l	1000	1000	1000

Sample was mixed and the absorbance of sample (As) was measured against standard (Astd.) reagent blank within 5 to 20 minutes. It was measured at a wavelength of  $505 \pm 5$  nm of given samples against the reagent blank. In general, levels of fasting blood glucose up to 100 (mg/dL) are considered normal, Persons with levels between 100 and 126 mg/dL may have impaired fasting glucose or pre-diabetes

### Cholesterol Estimation

End point method for quantitative in vitro determination of cholesterol in human serum with spectrophotometer was used in this study. Enzymatic methods involving cholesterol esterase, oxidase and Trinder color system have replaced older methodologies and the estimation has been shown in the Table 2. Serum sample collected by standard procedure stable for 7 days at -20 °C. The Assaying was done by using Crescent Diagnostic Kit, KSA for Cholesterol is used.

**Table 2:** Cholesterol Estimation by using enzymatic method

Pipette into cuvette	Blank	Standard	Test(sample)
Cholesterol Reagent	1ml	1ml	1ml
Standard $\mu$ l	-	10	-
D.W $\mu$ l	-	-	10

Mix and measure the absorbance of sample (As) and standard (Astd.) against reagent blank after an incubation for 10 minutes. Measure at a Wavelength of  $540 \pm 5$  nm of given samples against the reagent blank. Classifications were made under the headings of Desirable (<200) Borderline (200- 239) and High ( $\geq$ 240).

**Statistical Analysis**

Statistical analysis was performed using SPSS, version 15.0 and data were presented as means, standard deviations (SD) and percentages.

**Results**

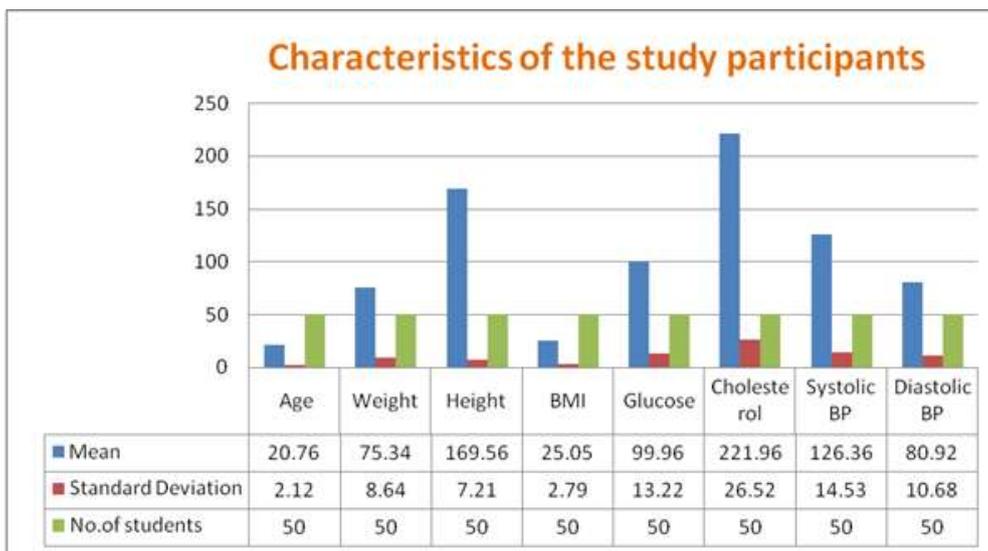
A total of fifty students' age, weight, height, Body Mass Index, BP, Blood sugar, physical exercise, smoking and Cholesterol were summarized in Fig. 1 and Fig. 2.

Anthropometric reference indices of obesity and overweight were summarized in Table 3 Prevalence of diabetes was present in males as 30% and pre diabetes 70%. The mean fasting plasma glucose concentration level of the male was observed as 99.96±13.22mg/dl. The maximum-recorded for fasting blood glucose concentration was 213 mg/dl. As depicted in Table 2, 36 % of participants were hypertensive and 64 % were Pre Hypertensive, 24% of the group showed high cholesterol (≥240) indicated the

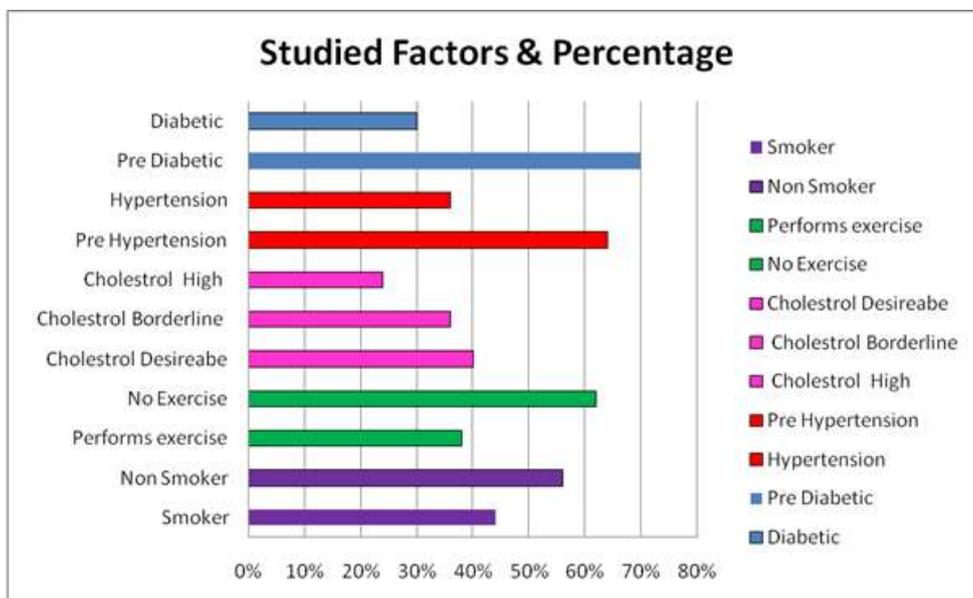
occurrence of pre-hypertension, cholesterol and pre-diabetic were linked with some of the risk factors like smoking, gender and physical activity. The mean systolic pressure of the participants was 126.36±14.53 mmHg and the mean diastolic pressure was 80.92±10.68 mmHg.

**Table 3:** Anthropometric reference indices of obesity and overweight

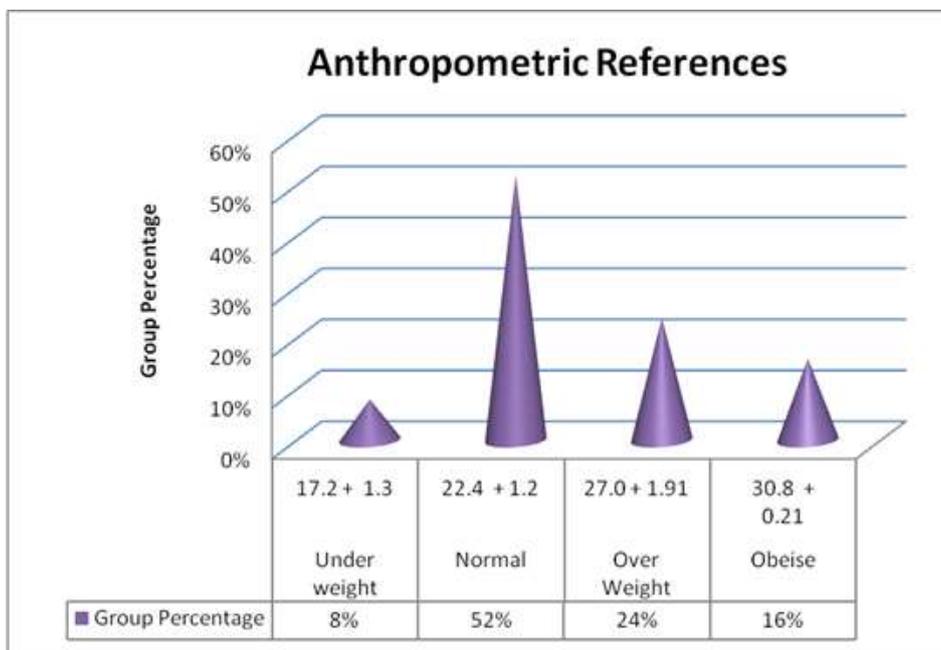
Body Weight Status	BMI kg/m2	Mean ± SD	No	Percentage
Under weight Normal Over Weight Obese	< 18.5	17.2 ± 1.3	4 26 12 8	8% 52% 24% 16%
	18.5-24.9	22.4 ± 1.2		
	25.0-29.9	27.0 ± 1.91		
	≥ 30	30.8 ± 0.21		



**Fig. 1:** Graph showing characteristics of the study participants



**Fig. 2:** Prevalence of diabetes, hypertension and associated factors (Samples =50)



**Fig 3:** Anthropometric reference indices of obesity and overweight

The Fig. 3 and Table 3 show Anthropometric reference indices of obesity and overweight that the percentages of Underweight, Normal weight, Over Weight and Obese subjects are 08,52,24,16. The majority of the participants reported normal weight i.e., 52%. The findings showed that the results of cholesterol level is Desirable among 40% of the study population, 36% were in borderline and 24% reported high cholesterol.

**Discussion**

The results in this study showed that high percentage of participants i.e. 70% are pre diabetes, which is partly due to a more sedentary lifestyle and smoking and weight gain. 62% of participants reported no physical exercise in daily life. Habit of smoking is present among 44% of the participants over weight and obesity showed as 24% and 16% respectively. The normal level of fasting blood glucose is up to 100 mg/dL and pre-diabetic is considered as when the glucose levels in the range of 100 to 126 mg/dL. The results showed that 70% participants were Prediabetics and 30% were Diabetics. These levels are considered risk factors for type 2 diabetes and its complications (Estacio *et al.*, 2011).

In this study, students were considered diabetics when fasting blood glucose levels were 126 mg/dL or higher and random blood glucose levels were higher than 200 mg/dL. High concentration level of glucose in the blood more often indicate diabetes, but there are many other disease conditions can also lead to high blood glucose, from the research study most of the sample indicated high blood sugar classified as Pre-diabetes which defined as a state in which the individuals have blood glucose concentration higher above the normal but not high enough to be classified as diabetes (Mokdad *et al.*, 2000) People suffering with pre-

diabetes have an increased risk of developing type 2 diabetes (Estacio, 2003) because diabetes and high blood pressure share certain physiological traits they tend to occur together and the effects-such as increased fluid volume, increased and arterial stiffness and impaired insulin handling- caused by each disease tend to make the other disease more likely to occur (Martins and Norris, 2003).

Hypertension has been significantly associated with diabetes. From the results of observational studies showed diabetes and hypertension have approximately twice the risk of people to get cardiovascular disease in contrast to non-diabetic people with hypertension. Hypertensive diabetic patients are also at increased risk for diabetes-specific complications including retinopathy and nephropathy (Whitworth, 2003). The prevalence of high blood pressure among the participants was 36% and 64% were prehypertensive. Students with a systolic blood pressure of 120–139 mmHg and diastolic blood pressure of 80–89 mmHg should be given lifestyle behavioral therapy alone for a maximum of 3 months and then, if they were not achieved, they should also be treated pharmacologically (Jo *et al.*, 2001)

Diabetes and high blood pressure are likely to occur together simply because both diseases share a common set of risk factors such as body mass. The risk of both diabetes and high blood pressure is significantly 5 increased with being overweight (Law *et al.*, 1991)

The study findings showed that the results of cholesterol level is Desirable among 40% of the study population, 36% were in borderline and 24% reported high cholesterol. Cholesterol is the main associated factor to develop hypertension. Classifications were made under the headings

of Desirable (<200) Borderline (200- 239) and High ( $\geq$  240).

Studies showed that the obesity has become a major health problem and is closely associated with different health problems. Obesity and weight assessed by using Body Mass Index of the participants and classified as Underweight < 18.5BMI , Normal weight 18.5- 24.9BMI Over Weight 25.0- 29.9BMI , Obese  $\geq$ 30 BMI (WHO, 2000) The result showed 52% among the participants were in normal weight , 24% were overweight and 16% were obese.

An increased prevalence of obesity among students of study group has been shown to be associated with increased high blood glucose and high blood pressure. We believe that the increase in overweight and obesity. Prevalence can be explained in part by physical exercise, habit of smoking, lifestyle and weight gain or obesity from fast food consumption with excessive carbohydrate and fat content. The low physical activity of students may have effects on the increasing prevalence of obesity (Executive Summary of the Third Report of The National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults, 2001; Pate., 1995).

In conclusion, the prevalence of diabetes, hypertension and associated factors like cholesterol, obesity and hypertension do exist in the studied sample. Several socio economic and lifestyle factors contributed to the development of overweight and obesity among the students of jazan. Smoking, physical inactivity, obesity and cholesterol level were associated with the risk of Pre-hypertension, hypertension, pre-diabetics and diabetics. Hence, it can be concluded that the study found out that most of diabetic patients suffer from co-existing hypertension. So active search for early detection of hypertension and related cardiovascular risk factors should be important part of diabetic follow up.

Furthermore the study pointed out that obesity, physical inactivity and diabetes are associated with hypertension co-existing with diabetic which maybe in tailoring management of hypertension among diabetics.

### Acknowledgement

The author gratefully acknowledge the help offered by Jazan general hospital and Aborish general hospital, Jazan. We are also very much grateful to the hard work offered by field supervisors (Staffs and lab technicians) for their effort in data collection. The Support of Saleh Mohamed Saleh Abdullah, Dean, College of Applied Medical Sciences and Dr. Aymen Madkhali, Head of the Department MLT, Jazan University, Jazan is very much appreciated.

### References

Alberti KG and Zimmet PZ (1998) for the WHO Consultation. Definition, diagnosis and classification of diabetes

mellitus and its complications. Part 1: Diagnosis and classification of diabetes mellitus. Provisional report of a WHO consultation. *Diabet Med* **15**: 539 DOI: 10.1002/(SICI)1096-9136(199807)15:7<539::AID-DIA668>3.0.CO;2-S

Bojar I, Humeniuk E, Owoc A, Wierzba W and Wojtyta A (2011) Exposing women to workplace stress factors as a risk factor for developing arterial hypertension. *Ann Agric Environ Med* **18**: 175–182.

Estacio RO, Jeffers BW, Gifford N and Schrier RW (2000) Effect of blood pressure control on diabetic microvascular complications in patients with hypertension and type 2 diabetes. *Diabetes Care*. **23**(suppl 2):B54-B64.

Executive Summary of the Third Report of The National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults (2001) *JAMA* 285:2486 - 97.

Gavin III JR, Alberti KGMM, Davidson MB and DeFronzo RA (1997) Report of the expert committee on the diagnosis and classification of diabetes mellitus. *Diabetes care* **20**(7): 1183-1197.

Gordon H (2003) Hypertensive Vascular Disease: Harrison's Principles of Internal Medicine, 15th Edition. page 1414-1429.

Gower BA (1999). Syndrome X in children: Influence of ethnicity and visceral fat. *Am J Human Biol*. **11**: 249-257. DOI: 10.1002/(SICI)1520-6300(1999)11:2<249::AID-AJHB12>3.0.CO;2-#

Jo I, Ahn Y, Lee J, Shin KR, Lee HK, Shin C(2001) Prevalence, awareness, treatment, control and risk factors of hypertension in Korea: the Ansan study. *J Hypertens* **19**(9): 1523–1532. DOI: 10.1097/00004872-200109000-00002

Law MR, Frost CD and Wald NJ (1991) By how much does dietary salt reduction lower blood pressure? III—Analysis of data from trials of salt reduction. *BMJ* **302**: 819–824. DOI: 10.1136/bmj.302.6780.819

Martins D, Norris K (2003) Combating diabetic nephropathy with drug therapy. *Current Diabetes Reports*. **1**: 148-156. DOI: 10.1007/s11892-001-0027-5

Mokdad AH, Ford ES and Bowman BA (2000) Diabetes trends in the US: 1990-1998. *Diabetes Care*. **23**:1278-1283. DOI: 10.2337/diacare.23.9.1278

Mokdad AH, Ford ES and Bowman BA (2000) Diabetes trends in the US: 1990-1998. *Diabetes Care*. **23**:1278-1283. DOI: 10.2337/diacare.23.9.1278

Pan W, Chang H, Yeh W, Hsiao S and Hung Y (2001) Prevalence, awareness, treatment and control of hypertension in Taiwan: results of Nutrition and Health Survey in Taiwan (NAHSIT), 1993–1996. *J Hum Hypertens* **15**: 793–798.

Pate RR, Pratt M and Blair SN (1995) Physical activity and public health. A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *JAMA*. **273**: 402 - 407. DOI: 10.1001/jama.1995.03520290054029

- Shapo L, Pomerleau J and McKee M (2003) Epidemiology of hypertension and associated cardiovascular risk factors in a country in transition: a population based survey in Tirana City, Albania. *Epidemiol. Commun. Health* **57**: 734–739. DOI: 10.1136/jech.57.9.734
- Whitworth JA (2003) World Health Organization, International Society of Hypertension Writing Group. 2003 World Health Organization (WHO)/International Society of Hypertension (ISH) statement on management of hypertension. *J Hypertens.* **21**: 1983-1992. DOI: 10.1097/00004872-200311000-00002
- Wolf-Maier K, Cooper RS, Banegas JR, Giampaoli S, Hense HW and Joffres M (2003) Hypertension prevalence and blood pressure in 6 European countries, Canada and the United States. *JAMA* **289**: 2420–2422. DOI: 10.1001/jama.289.18.2363
- World Health Organization (WHO) (2000). Obesity: preventing and managing the global epidemic (No. 894). World Health Organization.