

# HYPERTENSION IN PERSONNEL FROM UNIVERSIDAD ESTATAL A DISTANCIA IN COSTA RICA

*MSO Lourdes Arce Espinoza<sup>1</sup>, M.Sc. Julián Monge-Nájera<sup>2</sup>*

*<sup>1</sup>Nurse, Medical Services, Costa Rican State University for Distance Education (Universidad Estatal a Distancia-UNED), [larce@uned.ac.cr](mailto:larce@uned.ac.cr)*

*<sup>2</sup>Researcher, Office of the Vice President for Research, UNED, [julianmonge@gmail.com](mailto:julianmonge@gmail.com)*

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## ABSTRACT

*The prevalence of Arterial Hypertension (AHT) has increased worldwide and preventive measures are insufficient since only one third of the population is being treated. AHT is the primary cause of morbidity and mortality in the world. In this article is presented the first study on hypertension levels of personnel of a Distance Education university based on the analysis of all medical consultations in the Costa Rican State University for Distance Education (Universidad Estatal a Distancia-UNED) as of December 15, 2007 (1,526 medical files). The population studied ranges from 20 to 70 years of age and is comprised of residents of the Greater Metropolitan Area (Costa Rica) with varied socioeconomic and academic levels. The Statgraphics Centurion XV software and the chi-square test were used to analyze variables such as treatment administered, sex, age, and type of work. Only 45 patients knew that they suffered from hypertension prior to their consultation with the university medical service and 136 were treated with Enalapril and Hydrochlorothiazide. The number of hypertensive patients is higher among those who have worked at the institution for more than 20 years, especially in those holding higher positions. No marked differences were found between men and women. It is concluded that the existence of a university medical service has permitted faculty and staff to satisfactorily control their blood pressure.*

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**KEY WORDS:** Hypertension, outpatient service, distance education, university personnel, Costa Rica.

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## Introduction

Arterial hypertension (AHT) is a chronic disease that is usually asymptomatic and is characterized by the elevation of the systolic blood pressure (SBP) above 120 mmHg and/or diastolic blood pressure (DBP) above 80 mmHg. The prevalence of arterial hypertension has increased between 3% and 18% worldwide between 1999 and 2002. Preventive programs and measures are insufficient since only one third of this population is being treated (Hajjar and Kotchen, 2006).

AHT is the primary cause of morbidity and mortality worldwide, with 7.1 million deaths in 2006 (Holguin, Correa, Arrivillaga, Cáceres, and Varela, 2006). It is caused by the sum of modifiable (overweight, sodium consumption above 1.5 grams per day, alcohol consumption, physical inactivity, smoking, and a diet rich in fats) as well as non-modifiable risk factors (gender, ethnic group, age, and heritage) (Huerta, 2001; Vásquez, Fernández, Álvarez, Roselló, and Pérez, 2006; Li et al, 2005).

The presence of AHT, together with obesity, dyslipidemia, and insulin resistance, is known as metabolic syndrome (MS). Metabolic disorders and their relationship with AHT have been widely described during the last 10 years, as well as the increased risk of other coronary complications and possible mortality resulting from different combinations of risk factors (Jarvis et al, 2007; Gao, Nelson, and Tucker, K., 2007; Xiang, Nelson, and Tucker, 2007).

It has been statistically proven that women maintain better control of AHT than men (Plans, Tesserras, Pardell, and Salleras, 2002), and that with age figures increase between 20 and 30 mmHg in patients 40 years of age and those above 60 (whether normotensive or hypertensive). After the age of 70, normotensive patients have a 90% risk of developing hypertension due to the hardening of blood vessels (Vásquez et al, 2006).

A total of 16% of hypertensive patients have not been diagnosed mainly because they have no access to health care, have low schooling (they are unable to recognize risk factors for AHT), and exhibit no symptoms (Méndez and Rosero, 2007). In addition, popular beliefs regarding treatment and ways to avoid this pathology significantly lower control rates (Wilson et al, 2002). Cultural aspects and life styles continue to be a common problem contributing to morbidity and mortality in AHT (Han, Kim, Kang, Kim, and Kim, 2007).

Another decisive factor in AHT is stress. Research suggests that work stress significantly contributes to AHT because it alters the normal physiological rest and recovery processes (Yang, Schnall, Jáuregui, Su, and Baker, 2006). Although epidemiological studies relate work stress with the appearance of AHT, regardless of the occupation, this statement requires further study (Rose, Newman, Bennet, and Tyroler, 1999; Rubio, Vallejo, and Martínez, 2000).

Family history or inheritance is also a determining factor in the appearance of AHT (Katzmarzyk, Rankinen, Perusse, Rao, and Bouchard, 2001; Goldstein, Shapiro, and Guthrie, 2006). In addition, in those cases where there is no family history of AHT, some authors consider that family can be a source of stress that produces long-term adverse effects and, consequently, the appearance of AHT. Whether due to inheritance or the stress produced, family could be responsible for a high percentage of risk in the appearance of AHT (Huerta, Bautista, Irigoyen, and Arrieta, 2005).

Studies on children and adolescents with a family history of AHT recognize that, in spite of the fact that levels were within the normal parameters, their variability suggests that family history is an important risk factor and, therefore, plays a significant role in the appearance of AHT during adulthood (Lawlor et al, 2005; Borges, Peres, and Horta, 2007; Barton, Gilbert, Baramme, and Granger, 2006; Hulanicka, Lipowicz, Koziel, and Kowalisko, 2007).

Statistically, stress, ire, anxiety, and depression are strongly related to AHT (Olmos et al, 1999; Jhalani et al, 2005; Yan et al, 2006). Risk factors are the same in all ethnic groups; however, the pathology is more aggressive in patients of African descent. (Hayes et al, 2003; Holmes, Arispe, and Moy, 2005; Higginbottom, 2006).

In Costa Rica arterial hypertension is one of the most frequent causes for medical consultation and one of the most expensive pathologies in outpatient service. By 2060, the

senior population in Costa Rica is expected to increase to 2 million, together with the occurrence of chronic diseases and their costs in health care (Méndez and Rosero, 2007).

In this article is presented the first study on hypertension levels of personnel of a Distance Education university. The relationship between sex, age, and type of work is analyzed for the personnel of the Costa Rican State University for Distance Education (*Universidad Estatal a Distancia-UNED*). No previous studies have been made.

## Methodology

### Instruments

Medical files as a primary source of information

CERTIFIED TYCOS sphygmomanometer

LITTMANN stethoscope

The latter two used to take blood pressure.

### Subjects

Subjects included all UNED outpatients who were seen for AHT between January 14, 2002 and December 14, 2007, totaling 179 hypertensive patients: 95 women and 84 men.

The population studied was between 20 and 70 years of age (mean: 22.3 years of age) and was comprised of residents of the Greater Metropolitan Area of Costa Rica with varied socioeconomic and academic levels since the study included support personnel (e.g., janitors), faculty (with Master's and PhDs), department heads and other high administrative personnel. Marital status: 140 married, 29 cohabitating, and 10 single. The majority of the population has worked in the institution for a period between 6 months and 30 years (UNED Medical Services Archives).

### Procedures

Data was collected from the primary source of information in two stages. The first stage included the review of medical files (a total of 1,526) to determine which patients had been seen for AHT, totaling 179 patients. The second stage included entering data in an Excel file. This record was used to codify and statistically analyze data (see section on Statistics).

### Ethical Aspects

This study was approved by the Office of the Vice President for Research at UNED, the division that oversees the ethical and administrative aspects of the research projects conducted at the institution. Patient consent was not necessary since this was *a posteriori* analysis of institutional statistical data in which patients were not subjected to experimental treatments and no individualized data was used (this analysis is similar to the institutional statistics published by the Costa Rican Social Security Administration).

## Statistical Analysis

An Excel spreadsheet and the Statgraphics Centurion XV statistical software were used to group and analyze the data. In addition, a descriptive-quantitative methodology was applied to present the distribution of patients by sex, age, treatment, and type of work. The hypothesis was tested through the chi-square contingency test, which measures relationship between variables. The m-regression was utilized for the relationship between age, sex, position, and hypertension. The rejection value for the hypothesis was 0.05.

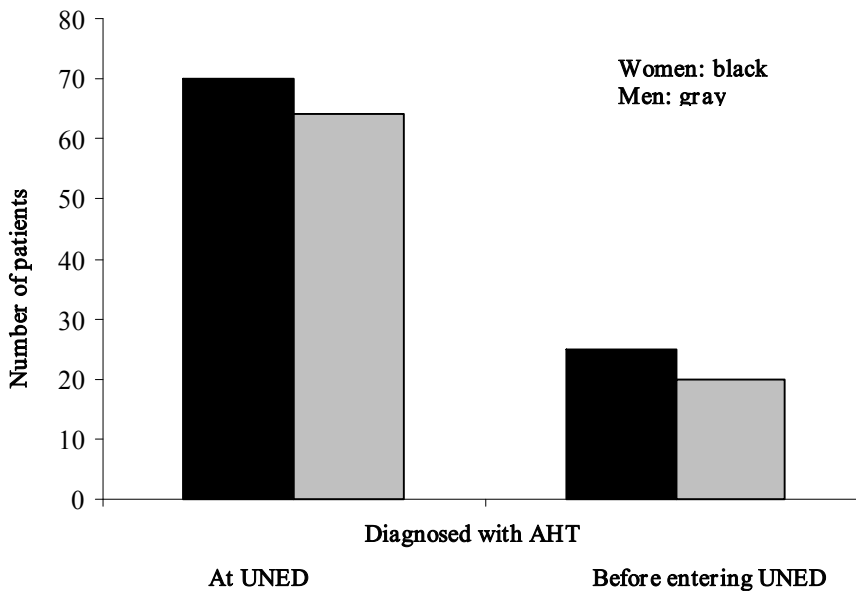
## Results

From the 1,526 individuals with a medical file, 179 were seen for AHT (12 %).

### Distribution of UNED Personnel by Gender and Arterial Hypertension Background

Only 45 patients knew of their AHT problem before consultation at the institutional medical service. Ratio does not differ between women and men ( $X^2=0.05$ , degrees of freedom=1,  $p=0.8231$ ; Graph 1).

Graph 1. Distribution of UNED Personnel by Gender and Arterial Hypertension Background



Source: UNED Medical Services Archives, 2007

**Antihypertensive Therapy**

There is a complex variety of administered treatments. From the total number of patients, 69 men and 67 women receive treatment including Enalapril, Hydrochlorothiazide or a combination of the two. The remaining 26 women and 17 men receive other types of treatment (Table 1).

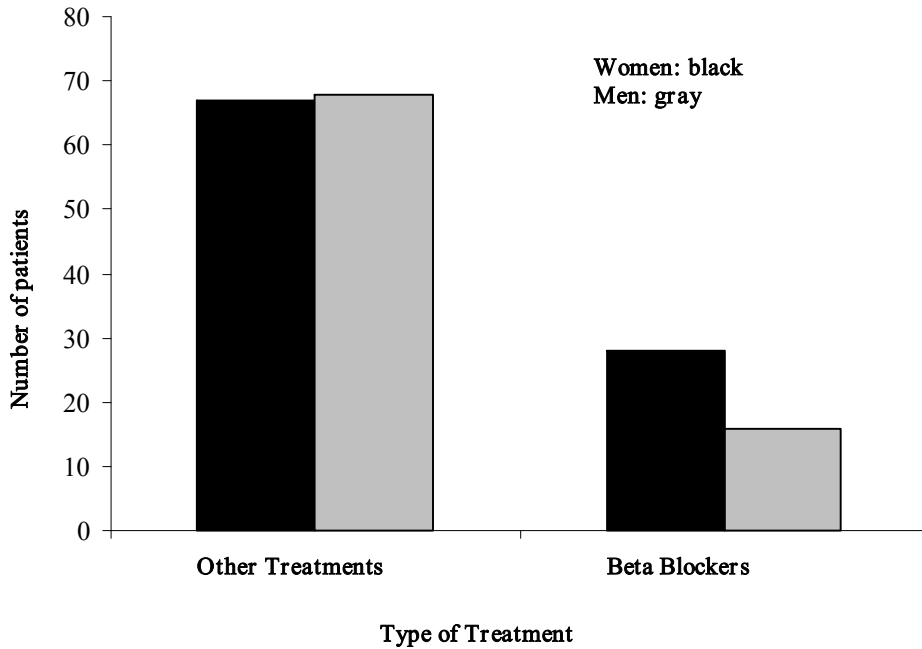
**Table 1 Distribution of Antihypertensive Therapy in UNED Personnel**

<b>Treatment</b>	<b>Women</b>	<b>Men</b>
Enalapril	22	37
Enalapril + Hydrochlorothiazide or Tritace + Hydrochlorothiazide	12	14
Amlodipine	8	6
Atenolol/ Propranolol	9	6
Hydrochlorothiazide/ Furosemide	5	1
Irbesartan/Losartan/Aprovel	8	1
Atenolol/Propranolol + Hydrochlorothiazide or Ziac	9	3
Other combinations	22	16

Source: UNED Medical Services Archives, 2007

Most male patients were not treated with beta blockers, which have been associated with erectile dysfunction, but have rather received a slightly higher proportion of Enalapril and Hydrochlorothiazide than women. However, in this respect the difference between women and men is only slightly significant (Fisher's Exact Test,  $p=0.0497$ ; data grouped in two categories as required by the test: 1=Enalapril, Hydrochlorothiazide or both; 2=Other. Graph 2).

**Graph 2. Distribution of Treatment Prescribed to UNED Personnel by Gender**



Source: UNED Medical Services Archives, 2007

### **Relationship between Seniority, Age, Sex, and Hypertension in UNED Personnel**

Twenty four percent of the patients that have worked for more than 20 years in the institution are hypertensive. This value is similar for those who been less than 10 years (23%) in the University. On the contrary, hypertension rate does not exceed 8% in those who have worked at UNED for 11 to 20 years (Table 2). The majority of hypertensive patients are above 40 years of age. No differences were found between women and men (Table 2) ( $X^2=1.7$ , degrees of freedom=2,  $p=0.4274$ ).

**Table 2. Number of UNED Hypertensive Patients Distributed by Seniority, Age, Sex**

<b>Seniority (years completed)</b>	<b>Women %</b>	<b>Men %</b>
0-10	23	20
11-20	5	8
21-30	24	20
<b>Age (completed years)</b>		
20-30	3	3
31-40	4.50	7.75
41-50	20.70	16
51-60	23	15
61-70	2.30	5

Source: UNED Medical Services Archives, 2007

### **Relationship between Arterial Hypertension and Occupation of UNED Personnel**

The hypertensive patient ratio is related to the type of occupation (Table 3) since those who are department heads and hold other high positions have a higher hypertension rate ( $X^2=6.76$ , degrees of freedom=4,  $p<0.05$ ). The forgoing is confirmed by a multiple regression that crossed sex, age, and position as possible predictors of hypertension, which indicated that position is the associated variable ( $R^2=0.0487$ ;  $p 0.001$ ;  $N=1,526$  patients).

**Table 3. Number of UNED Hypertensive Patients Distributed by Occupation**

<b>Occupation</b>	<b>Subtotal of Patients and Percentage of Hypertensives (%)</b>	<b>Total UNED Employees in this Category</b>
<b>Department heads and other high administrative positions</b>	64 (33 %)	192
<b>Faculty</b>	54 (5%)	1107
<b>Rest of administrative personnel</b>	30 (4 %)	784

Source: UNED Medical Services Archives, 2007

Ninety percent of UNED hypertensive employees monitor their blood pressure at least once a month when they receive their check up or when they pick up their hypertension treatment. A total of 10% check their blood pressure at least twice a year because they monitor it at other health institutions and their blood pressure is taken when they go to the doctor for other reasons (L. Arce, personal observation).

## **Discussion**

### **Distribution by Sex and Arterial Hypertension Background**

Most of the AHT cases were detected by the medical service personnel at UNED as only 45 patients knew of their condition before working at the University. Their pathology is currently controlled at UNED. The foregoing shows an advantage of offering health services in the institution. Easy access to such services permitted detection of the majority of the cases and control within the population.

Based on the literature, epidemiological data indicates that the risk of suffering from AHT is higher in men than in women and that the symptoms for this pathology start to appear at the age of 45 (men) and 55 (women). However, it should be remembered that some cases are asymptomatic and it is diagnosed by controlling blood pressure (BP) (Plans et al, 2002). No significant differences were found in this study in the AHT rate between men and women. A possibility could be that UNED female personnel visit the medical services more frequently for checkups, family planning, prenatal care, etc., which increases both the probability of discovering this pathology and women's recorded AHT rate to the same level as men's.

## **Antihypertensive Therapy for Men and Women**

There are many combinations of antihypertensive treatments. These are prescribed after conducting medical tests and controlling blood pressure and depend on the person's physiological response, medical history, and results from a medical examination.

According to Grimm et al (1996), most patients are treated with Enalapril and a diuretic, or other therapeutic combinations, without any prescription differences between men and women. Although the use of antihypertensive medication, specifically beta blockers such as Propranolol and Atenolol, has been associated with erectile dysfunction, there exists controversy in this respect. For instance, the Treatment of Mild Hypertension Study (TOMHS) conducted in 1996 analyzed 902 hypertensives that were taking diuretics, beta blockers, ACE inhibitors, alpha blockers, or calcium antagonists. After a four-year follow up, erectile dysfunction was related to the age of the patient rather than to the type of drug used (Grimm et al, 1996). In the case of UNED, only a small percent of the population uses this medication and none of the patients has reported it as a side effect.

## **Seniority, Age, and Sex Ratio**

With age, individuals tend to gain weight. Aging and the loss of elasticity in blood vessels, intensified in women by the decreased levels of estrogens (Molina, 2007), is coherent with the increase in hypertensive cases after the age of 40.

## **Occupation and Arterial Hypertension**

Even though AHT is associated with a number of modifiable and non-modifiable factors, it is the sum of those factors that causes this pathology. The stress produced by the complex functions of being the head of a department (Olmos et al, 1999; Jhalani et al, 2005; Yan et al, 2006) explains the reason why those who hold these positions have the highest AHT percentages at UNED.

## **Conclusions**

The following conclusions are drawn from the results obtained:

1. Easy access to an institutional medical service has permitted the detection of a significant number of previously unknown hypertensive cases as well as the adequate treatment for patients.



2. Most patients are treated with Enalapril and Hydrochlorothiazide and no erectile dysfunction problems have been reported when beta blockers are used.
3. There is not a defined pattern indicating that hypertension clearly increases with years of service.
4. An important ratio of hypertensive patients is noted for men and women older than 40.
5. Department heads present more hypertension cases.

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