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Research Brief

Hypertension in Tunisian adults attending primary care physicians (ETHNA-Tunisia)

Rachid Boujnah[a], Laila Nazek[b], Morched Maalej[c], Youness EL Achhab[d,e,*], Chakib Nejjari[d,f]

[a] CHU Mongi Slim La Soukra, Tunis, Tunisia, Tunisia
[b] Novartis Pharma Maroc SA, Casablanca, Morocco
[c] Novartis Pharma Maroc SA, Tunisia
[d] Laboratory of Epidemiology, Clinical Research and Community Health, Faculty of Medicine and Pharmacy of Fez, University Sidi Mohamed Ben Abdellah, Morocco
[e] Regional Centre for Careers Education and Training of Fez-Meknes, Morocco
[f] Mohammed VI University for Health Sciences, Casablanca, Morocco

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ABSTRACT

The aim of the Epidemiological Trial of Hypertension in North Africa (ETHNA-Tunisia) was to evaluate the prevalence and clinical profile of hypertension in a large sample of individuals in Tunisia. This was multicenter, epidemiological, cross-sectional study conducted in patients consulting primary care physicians in Tunisia. Mean age of 5802 individuals was 49.6 ± 16.3 years. The total prevalence of hypertension was 47.4% (adjusted for age: 26.9%). Control of hypertension was only 37.1%. Hypertension may also be underdiagnosed and ineffectively treated. Greater awareness and improved management of hypertension and cardiovascular risks are needed in Tunisia.
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1. Introduction

Epidemiological transition occurring in the majority of low- and middle-income countries (LMICs) is characterized by an increased exposure to risk factors driven by changes in diet, physical activity, and environment.[1] The result has been an increase in the prevalence of cardiovascular risk factors including hypertension, raising concerns about the potential development of an epidemic of cardiovascular disease in developing countries.

One region that has seen considerable economic development over the past few decades is North Africa. However, a good understanding of the current levels of hypertension and cardiovascular disease risks in the region, and especially Tunisia, is lacking. Some data from studies in specific cities or for specific ages are available on the prevalence of hypertension. Data collected from 8000 adults from Tunisia, estimated the prevalence of hypertension to be 30.6%.[2] Recently, in North Africa, a cross-sectional study Epidemiological Trial of Hypertension in North Africa (ETHNA) conducted in 28,000 patients consulting primary care physicians in Algeria, Tunisia and Morocco reported a high prevalence of hypertension (45.4%).[3] In this paper, we presented the results about hypertension from Tunisian patients' data.

2. Methods

This was a national, multicenter, epidemiological, cross-sectional study conducted in patients attending primary care physicians in Tunisia. The sample size was calculated based on an estimated prevalence of hypertension of 30%. With a risk of error of 1%, a difference of imprecision of 1.0% and a cluster effect of 2, the number to be included in the study was rounded to 6000 participants. Data were collected by participating primary care physicians using a standardized questionnaire. Patients were also clinically examined and measurements were taken for weight, height, waist circumference and blood pressure (BP). BP of participants was measured by a trained physician with the mercury sphygmomanometer. The participants were required to rest in a seated position for at least 5 min before the measurement. Two BP measurements were planned: one after 5 min of rest and the second following a further 2-min rest after the completion of the first measurement. When possible, BP measurements were recorded as the mean of the two measurements. Hypertension was

* Corresponding author at: Youness EL ACHHAB Laboratory of Epidemiology, Clinical Research and Community Health, Faculty of Medicine and Pharmacy of Fez B.P 1893, Km 2.2 Route Sidi Harazem, Fez 30000, Morocco.
E-mail address: youness_elachhab@yahoo.fr (Y.E. Achhab).

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Table 1
Proportions of individuals with a history of hypertension, control of hypertension and newly detected hypertension according to socio-demographic characteristics and personal medical profile.

Category	Total n (%)	History of hypertension (HH)		Control of hypertension (CH)		Newly detected hypertension (NH)	
		Total of individuals	Individuals with HH (%)	Total of individuals	Individuals with CH (%)	Total of individuals	Individuals with NH (%)
Age							
<50 years	2921 (50.2)	2883	27.8***	326	36.5	2557	14.6***
50–59 years	1279 (21.9)	1265	45.8	579	38.5	686	28.4
≥60 years	1627 (27.9)	1616	65.7	1062	35.5	554	35.2
Sex							
Female	3120 (53.7)	3087	37.2***	1147	36.7	1940	19.5
Male	2693 (46.3)	2663	30.8	820	36.2	1843	20.7
Area of habitation							
Rural	1183 (21.0)	1171	32.5	381	32.5	790	24.4***
Urban	4443 (79.0)	4392	34.9	1532	37.5	2860	18.9
Education							
Illiterate	1100 (19.2)	1087	56.9***	618	31.6**	469	32.8***
Elementary school	1219 (21.3)	1209	41.9	507	37.9	702	23.5
Secondary school	2168 (37.9)	2143	26.6	571	37.1	1572	18.4
University graduate	1237 (21.6)	1222	19.6	240	45.8	982	14.5
Smoking status							
Ex-smoker	588 (10.1)	584	50.2***	288	39.6	283	30.4***
Current smoker	1208 (20.8)	1194	23.3	274	32.5	909	21.8
Non-smoker	4023 (69.1)	3978	35.2	1381	37.5	2556	18.8
Abdominal obesity							
Yes	2419 (41.1)	2392	46.8***	1105	34.8*	1273	28.9***
No	3197 (58.9)	3164	24.8	771	39.9	2380	15.5
Diabetes mellitus							
Non-diabetic	4646 (80.8)	4588	27.4***	1236	39.2*	3332	18.7***
Type 1	907 (15.8)	902	62.3	555	33.7	340	30.9
Type 2	196 (3.4)	196	67.3	132	32.6	64	39.1
Hypercholesterolemia							
Yes	1187 (20.7)	1176	65.1***	755	35.0	0411	36.7***
No	4535 (79.3)	4483	26.4	1165	38.5	3301	17.9
Body mass index[a]							
Underweight (<18.5 kg/m^2)	113 (1.9)	113	8.8***	10	50.0*	0103	06.8***
Normal (18.5 to <25 kg/m^2)	2177 (37.0)	2156	21.3	455	42.4	1697	12.8
Overweight (25 to <30 kg/m^2)	2007 (34.1)	1983	37.9	743	35.9	1232	23.6
Obese (≥ 30 kg/m^2)	1507 (26.0)	1497	48.5	715	34.0	771	31.9

* $p < 0.05$.
** $p \leq 0.01$.
*** $p \leq 0.001$.
[a] World Health Organization classification.

identified according to the criteria of the European Society of Hypertension and the European Society of Cardiology (ESH/ESC) guidelines.[4] Details of material and methods was previousely published.[3]

Descriptive analyses were used to determine the crude prevalence of hypertension over the whole sample. In addition, age- and sex-adjusted rates were calculated by multiplying the age- and sex-specific rate for each age group in the study population by the appropriate weights from a standard population.[5] Data were analyzed by using binary logistic regression models to evaluate possible risk factors associated with the presence of hypertension. Odds ratios (OR) and 95% confidence interval (CI) were estimated. A test was considered significant when $p < 0.05$.

3. Results and discussion

The characteristics of the study participants are presented in Table 1. The mean age of participants was 49.6 ± 16.3 years, and almost 28% of participants were older than 60 years of age. Nearly 54% of the participants were female and 79% of participants lived in urban area.

Among the 5802 participants surveyed, 2750 individuals had hypertension, an overall crude prevalence of 47.4% [95% confidence interval (CI) 46.1%-48.7%]. Of these individuals, 1981 (72.0%) had a history of hypertension and 769 (28.0%) were detected with hypertension at the time of the study assessment. When adjusted for age and sex, the overall prevalence of hypertension was 26.9% [95% CI 26.4%-27.4%; 25.4% in men (95% CI 24.6%-26.1%) and 28.4% in women (95% CI 27.7%-29.1%)]. The ETHNA-Tunisia data shows that the prevalence of hypertension is high in population consulting general medicine.

The overall worldwide prevalence of hypertension was estimated at 26.4% of the adult population.[6] Results from our study, suggest an overall age-adjusted prevalence of hypertension to be 26.9% which is similar to that reported in the USA (28%) and Canada (27%) and was found a substantially lower compared with the European countries (Sweden, 38%; England, 42%; Spain, 47%; and Germany, 55%).[6] Ethnicity has played a role in the prevalence of hypertension in certain geographical areas. Epidemiologic studies demonstrating higher prevalence of hypertension among African Americans relative to those from continental Africa.[7] In Arab countries, hypertension prevalence varied widely between and within countries.[8] For national studies, hypertension prevalence ranged from 27.6% in Palestine[9] to 41.5% in Oman.[10] In the Tunisian context, data collected from 957 individuals in 1995–1996 in the city of Sousse, estimated the prevalence of hypertension to be 28.9%,[11] while a 2004–2005 national study in over 8000 adults (aged 35–70 years) reported a prevalence of 30.6%.[2]

Fig. 1 present hypertension severity in patients with a history of hypertension and newly detected hypertension. In total, 14.4% of patients had either normal or optimal blood pressure (BP) at the time of the study visit. Hypertension was more common in illiterate participants, women, ex-smokers, individuals who had abdominal or central obesity, diabetes and hypercholesterolemia.

Among 3834 individuals without a history of hypertension, 769 participants (20.0%) were detected with hypertension at the time of the study visit. Newly detected hypertension was higher in aged individuals, illiterate, people from rural areas, patients with diabetes, high cholesterol and obesity.

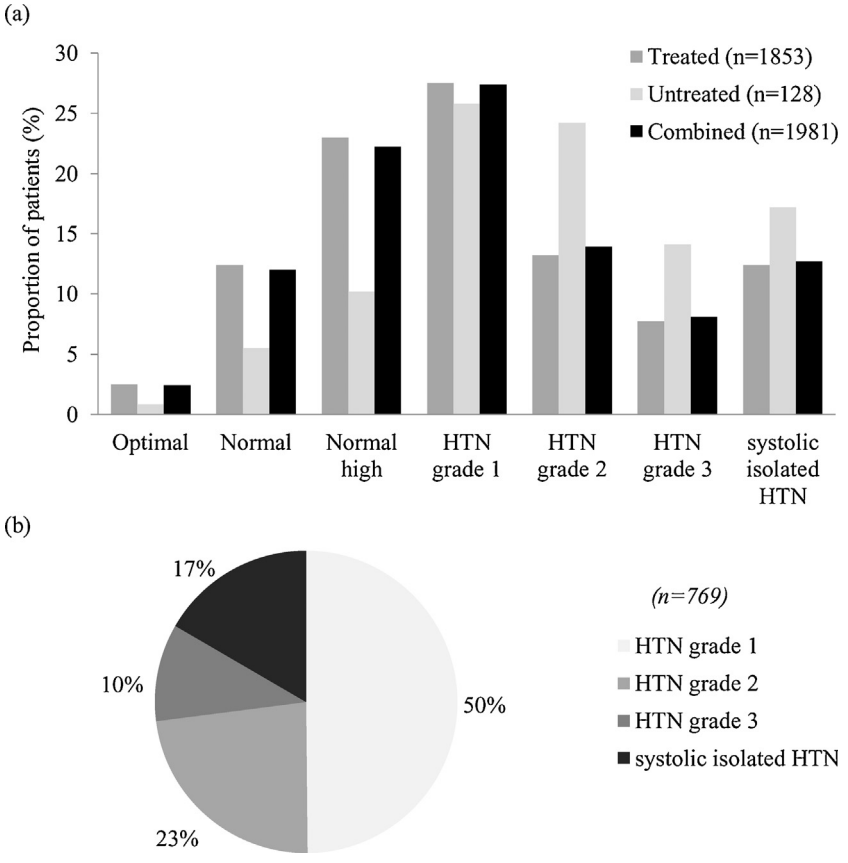

Fig. 1. Hypertension severity in patients with (a) a history of hypertension and (b) newly detected hypertension. Data presented are percentage of patients within each group. (*HTN: hypertension*).

Table 2
Significant independent variables (risk factors) for hypertension according to binary logistic regression analysis (final model).

Variables	OR	95% CI	p
Age, years old			<0.0001
<50	–	–	1
50–59	3.19	2.69–3.78	<0.0001
≥60	9.33	7.63–11.42	<0.0001
Education level			<0.0001
University graduate	–	–	1
Secondary school	1.14	0.94–1.38	0.185
Elementary school	1.57	1.26–1.96	<0.0001
Illiterate	1.65	1.25–2.17	<0.0001
Area of habitation (*urban vs rural*)	1.30	1.07–1.58	0.008
Abdominal obesity (*yes vs no*)	1.22	1.01–1.49	0.043
Obesity ($BMI \geq 30\,kg/m^2$ *vs* <30)	1.66	1.47–1.88	<0.0001
Diabetes mellitus (*yes vs no*)	1.76	1.45–2.14	<0.0001
Hypercholesterolemia (*yes vs no*)	2.49	2.05–3.01	<0.0001
Family history of hypetension (*yes vs no*)	2.43	2.08–2.83	<0.0001

History of hypertension was more common in women than in men (37.2% vs 30.8%). This could be related to the fact that around half of the women in the study were postmenopausal. However, links between cardiovascular risk and postmenopausal status have been an area of debate, and it may be argued that any increase in the prevalence of hypertension in these women could be attributed to their age and sex hormones.[12]

The results of binary logistic regression analysis, including OR for each of the socio-demographic factors, clinical data and family history of hypertension are presented in Table 2. Significant risk factors were related to age, education, residency, obesity, diabetes, hypercholesterolemia and family history of hypertension.

Hypertension prevalence was higher in olders and like in many studies; age represents a significant risk factor for hypertension.[8] In our study and several other studies, it was found that obesity is a strong risk factor for the development of hypertension.[8,13,14] Therefore, especially physicians from primary care centers should pay attention to the BMI of their hypertensive patients and encourage them to lose weight. Also, hypertension prevalence decreased in higher education consultants as proved in several studies[8,15–17] which was not demonstrated in the large study conducted by Ben Romdhane et al in the year 2004–2005.[2]

Generally, hypertension prevalence is significantly high in subjects with diabetes, hypercholesterolemia and familiy history of hypertension.[2] In our study, hypercholesterolemia (OR = 2.49) and familiy history of hypertension (OR = 2.43) were also principal risk factors for development of hypertension similarly in other studies.[2,15–18] Therefore, controling these risk factors would help the cardiovascular complications.

The results of this study indicate that patients with hypertension may not be receiving optimal treatment for achieving adequate BP control. Although 93.5% of patients with a history of hypertension were prescribed antihypertensive medication and only 37.1% of patients had controlled hypertension. Therefore, there is an urgent need to implement innovative strategies to improve hypertension treatment and control in Tunisia and generally in LMICs.

In conclusion, this study indicates that hypertension and cardiovascular risk factors are highly prevalent in Tunisia. Undoubtedly, awareness of hypertension and establishment of healthy lifestyles are encouraged.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

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