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May Measurement Month 2019: Screening Analysis In Spanish Community Pharmacies and Detection of Masked Hypertension

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KEYWORDS

Blood pressure, community pharmacists, Home Blood Pressure Monitoring (HBPM), hypertension, masked hypertension, screening

ABBREVIATIONS

ABPM: Ambulatory Blood Pressure Monitoring
BMI: Body Mass Index
BP: Blood Pressure
BPM: Beats per Minute
CPBPM: Community Pharmacy Blood Pressure Monitoring
DBP: Diastolic Blood Pressure
HBP: Hypertension
HBP: Hypertension
HBPM: Home Blood Pressure Monitoring
HENFAC: Study on Masked Hypertension in Community Pharmacies
HR: Heart Rate
ISH: International Society of Hypertension
MMM: May Measurement Month
MH: Masked Hypertension
mmHg: Millimetres of Mercury
OBPM: Office Blood Pressure Monitoring
SBP: Systolic Blood Pressure
SD: Standard Deviation
SEFAC: Spanish Society of Clinical, Family and Community Pharmacy
SEH-LELHA: Spanish Society of Hypertension-Spanish League Against Arterial Hypertension
SNHS: Spanish National Health Survey
TI: Treatment Inertia

ABSTRACT

Aim: To know within the scope of the May Measurement Month (MMM) project, the blood pressure (BP) situation in the Spanish population, disseminate the importance of its periodic measurement and estimate the prevalence of masked hypertension (MH).

Methods: Transversal descriptive study in Spanish community pharmacies during May 2019.

Subjects: adult users who agreed to take part.

Variables: systolic blood pressure (SBP), diastolic blood pressure (DBP) in millimetres of mercury (mmHg), heart rate (HR) in beats per minute (bpm).

Subjects with BP ≥130/85 and <149/90 were offered the possibility of home blood pressure monitoring (HBPM) to confirm MH.

Results: A total of 3402 valid records performed by 491 pharmacists. In all 61.9% women, mean age 56.6 years. A total of 143 (4.2%) had never measured BP and 918 (27.0%) had not measured BP in the last year; 1047 were taking anti-hypertensives, of whom 45.7% had high BP.

A total of 780 (22.9%) subjects had high BP values; both, 252 (7.4%). mSBP and mDBP was 125.0 mmHg and 76.5 mmHg, respectively; higher in men (P<0.001). mHR was 72.6 bpm.

A direct relationship was detected between SBP and DBP and BMI (P<0.0001). mSBP and mHR were higher in smokers (P<0.0001). In diabetic patients, SBP, DBP and HR were greater.

A total of 61 subjects with suspected MH agreed to undergo HBPM. A total of 25 (40.1%) resulted in BP ≥135/85 mmHg.

Conclusions: Almost a quarter of subjects had BP ≥140/90 mmHg. The risk factors most closely related to high BP were overweight, diabetes and age; 40% of suspected cases of MH were confirmed by means of HBPM.

INTRODUCTION

Keeping blood pressure (BP) above normal figures entails an individual risk with the highest impact on global cardiovascular morbi-mortality (1).

The most recent Spanish National Health Survey (SNHS) (2017) from the Spanish Ministry of Health sets out that the percentage diagnosed with hypertension (HBP) is 13.0% and 51.9% for the age range 25 to 64 years and 65 and over, respectively (2). However, other studies (3) calculate this as 42.6% for the population aged over 18, of which 88.3% of diagnosed hypertensives are in pharmacological treatment; of these only 20.4% have BP monitored, 24.9% and 16% are women and men, respectively (3).

† Salvador Tous i Trepat passed away prior to this paper's publication in October 2022. He fully contributed to this work. His friends and colleagues recall him with respect and affection.

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Despite the efficacy of pharmacotherapeutic tools, less than one-third of people in treatment have BP figures in accordance with current recommendations (4,5). However, the problem is greater as less than half of people with high BP are diagnosed and receive treatment (6,7). Access to medical care and pharmacological treatment is not equal in each and every country. There is major inequality in regard to the so-called "Western world". This situation is exacerbated in low and middle income countries where a study performed in more than ninety countries estimated that less than one-third of diagnosed hypertensive patients receive treatment and less than 10% have their BP monitored (6).

On top of under diagnosis, even in the most advanced countries and health systems, is another problem that to a large extent leads to not attaining BP monitoring aims: treatment inertia (TI) or clinical inertia in its management (8), defined as the "failure of health suppliers during the onset or intensification of treatment according to current clinical guidelines" (4,5). There are also "delays starting or intensifying treatment when required and despite knowing they are actually necessary" (9). A 2016 study (10) revealed that commencing treatment occurs in 26% of those diagnosed and only intensifies in 16% of diagnosed uncontrolled hypertensives visiting the primary care doctor.

BP values found in clinical practice do not always concur with those obtained outside of this. Masked hypertension (MH) is defined as: high BP values when the measurement is outside the scope of consultation but with normal values if this measurement is performed in clinical practice (11).

MH used to be associated with those untreated BP patients with a normal BP in consultation; but this is higher after home BP monitoring (HBPM) or ambulatory BP monitoring (ABPM). This is more common in young adults and adults within the normal-high blood pressure range (130-139/85-89 mmHg), whereby these values are used as a criteria for screening, and today deemed a high risk BP phenotype (12). As this raises the likelihood of suffering from a stroke or myocardial infarction twofold; as well as increased mortality for any reason in comparison to normal blood pressure (13). This is detected more often in people with type 2 diabetes mellitus (14) or chronic renal disease (15).

All this reveals to us there is much to improve in managing the problem of high BP in the population, both from a diagnostic point of view and its correct treatment and follow up.

The global project May Measurement Month (MMM) (16) promoted by the International Society of Hypertension (ISH) and commenced in 2017, aims to disseminate information on lifestyle and to study the situation. Persons who do not usually monitor their BP are especially targeted. At the same time increased awareness of the population in all countries taking part over the importance of periodic measurement of BP figures (16-18); and drawing the attention of authorities and healthcare system suppliers towards simple and effective tools that might provide notable benefits in terms of reduction of morbidity and mortality related to high BP.

Community pharmacy is the most accessible health resource for the Spanish population and the Spanish Society for Clinical, Family and Community Pharmacy (SEFAC), the population's scientific society, has opted to take part in the campaign with the purpose of raising visibility for the problem of hypertension and communicating the argument "A simple BP measurement can save a life". This work makes known the results of the MMM19 campaign in Spanish community pharmacies by SEFAC partner and collaborating pharmacists. This is a continuation of other prior related works (17-19), to which analysis of suspected MH in subjects with BP close to HBP (HENFAC Study) was incorporated this year.

AIMS

General

- To analyze blood pressure and masked hypertension monitoring in Spanish community pharmacy users included in the MMM global project.

Specific

- To ascertain the level of BP monitoring in elderly persons who have not been measured the past year.
- To determine the proportion of subjects with high BP not receiving treatment for hypertension.
- To verify the degree of BP monitoring in subjects receiving treatment for hypertension.
- To estimate the proportion of subjects with normal-high hypertension (possible masked hypertension) (HENFAC Study).
- To analyze the demographic characteristics and risk factors and their relationship with the results obtained from determinations of BP among subjects.

METHODS

Design and scope of study

Transversal descriptive study performed in Spanish community pharmacies in May 2019. This comprises the global project May Measurement Month promoted by the International Society of Hypertension (16). The methodology was reported in detail in Andrés et al (18).

Study population

Persons visiting community pharmacies taking part, in particular those who did not measure BP the past year.

Inclusion criteria

Persons ≥18 who visit the pharmacy and grant consent to take part in the MMM study.

Exclusion criteria

Minors or the elderly whose cognitive impairment or social situation might interfere with the study or who do not consent to take part.

Sample size

For the descriptive study, in the global project it was planned to obtain a total sample >1 million adults (≥18 years old) in particular those who had not measured BP the last years. The intention was to obtain a sufficient sample size in each country taking part but without specifying the number, to raise the degree of national awareness.

Variables

Primary endpoints

Systolic blood pressure (SBP), diastolic blood pressure (DBP) in millimetres of mercury (mmHg) and heart rate (HR) in beats per minute (bpm) expressed as mean ± standard deviation (SD), type of tensiometer used (automatic, non-automatic) and measurement arm (left/right).

Other variables defined in the registry sheet

These are the same as in the 2017 study (18) and the following have also been incorporated **(see Appendix)**:

9. Has your blood pressure ever been measured? (YES/NO)
10. Have you taken part in MMM2017 and/or MMM2018? (YES/NO).
11. Has a health professional ever diagnosed you with high blood pressure (except during pregnancy)? (YES/NO).
14. Are you fasting? (Yes/No).

Procedure (Figure 1)

All SEFAC partners were notified of the activity and sent the necessary material via e-mail: poster recruitment, protocol, access to specific website, MMM questionnaire (electronic case report form – eCRF), results booklet, explanatory leaflet and recommendations on a healthy lifestyle.

The MMM study website was enabled for data collection and entry.

1. Offer to users ≥18 years old who visited pharmacies during May 2019. In particular those who had not measured BP the past year were sought for recruitment.
2. Explanation of the campaign to tackle BP and the subject's consent.
3. Filling out the questionnaire.
4. The protocol to measure BP followed that set out in the global study (18,20).
   - Three separate measures were taken and recorded one minute apart. If the difference in the first two was greater than 10 mmHg an additional fourth measurement was taken. The result took into account the mean of the latter two measurements. If the measurement was manual, the pulse was taken one minute after the measurement.
   - Definition of hypertension (1,18,20,21):
     - Be taking at least one anti-hypertensive medicine.
     - Average of systolic blood pressure (average of the last 2 out of 3 readings) ≥140 mmHg.
     - Average of diastolic blood pressure (average of the last 2 out of 3 readings) ≥90 mmHg.
   - Pharmaceutical intervention:
     - If BP was <130/85 mmHg healthcare education was given on healthy lifestyles (issue of leaflets) and the study ended.
     - If BP ≥130/85 mmHg it was recommended confirming with OBPM (office blood pressure measurement) or HBPM (home blood pressure monitoring) and referral to the doctor, if necessary.
     - Information was provided on healthy diet and habits.
     - A minimal intervention was performed (advice) in the risk factors detected: smoking, overweight/obesity, stress, poor diet, inactivity, salt consumption, physical exercise, etc.

HENFAC Study

Subjects with screening results corresponding to normal-high BP (≥130/85 and <140/90 mmHg) according to the European guidelines to manage hypertension in force at that time (22), were proposed taking part in the HENFAC study. The possibility of performing OBPM in their home was offered.

1. The pharmacist provided the subject with the measuring device, registry sheet and gave them the necessary instructions for its management, home blood pressure monitoring and recording of results:
   a. Systolic blood pressure (two or three measurements) morning/afternoon for at least three consecutive days (recommendation seven days).
   b. Diastolic blood pressure (two or three measurements) morning/afternoon for at least three consecutive days (recommendation seven days).
   c. Heart rate (two or three measurements) morning/afternoon for at least three consecutive days (recommendation seven days).
2. For the HENFAC study an independent registry sheet was used **(Figure 2)**, in which this study's specific variables were collected.

All results were recorded anonymously in a form built *ad hoc* available on the website.

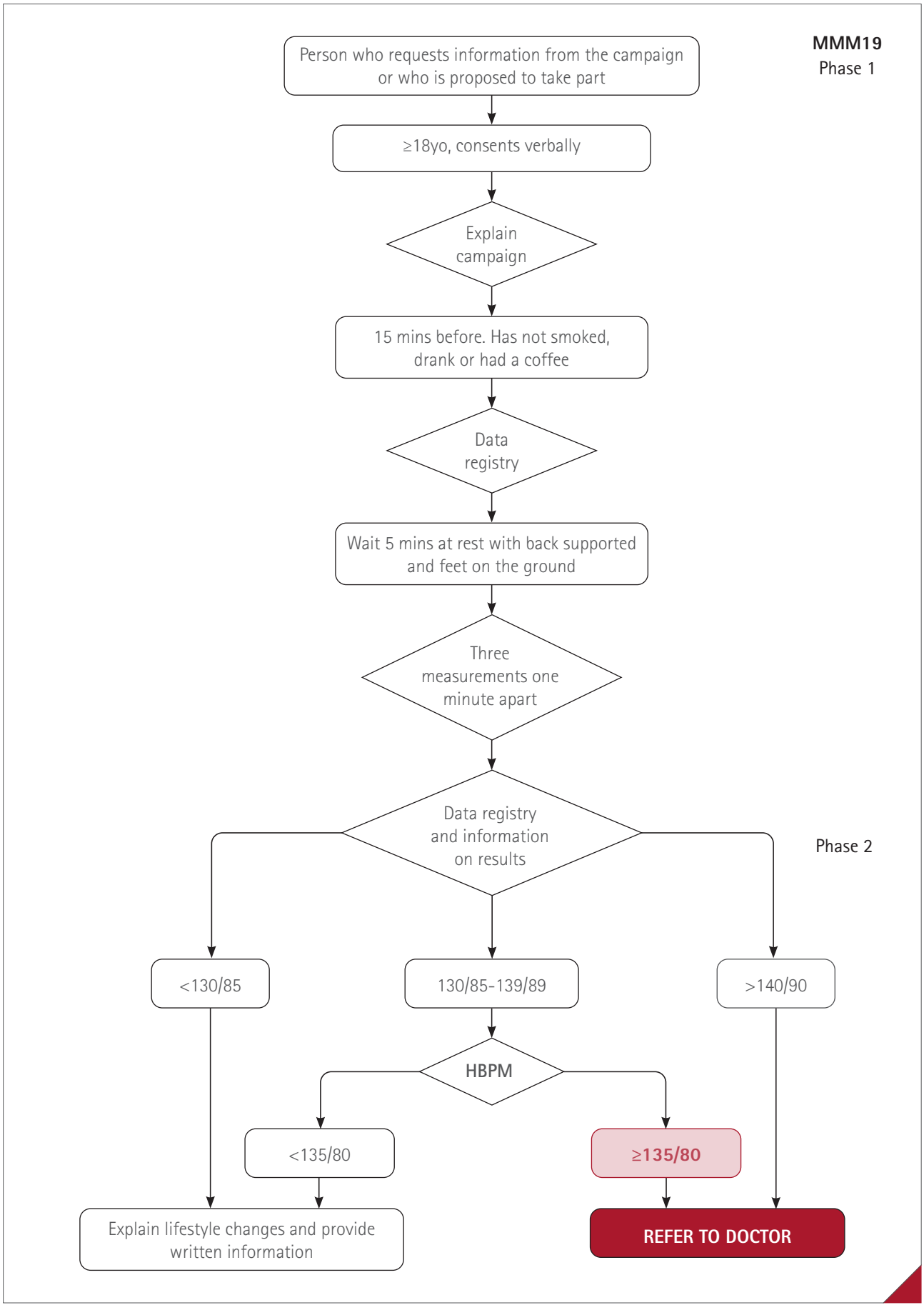

Figure 1 Flowchart of the procedure including the HENFAC study

Detección de fenotipo hipertensión enmascarada en población adulta que acude a la farmacia comunitaria (HENFAC)

HOME BLOOD PRESSURE MONITORING RECORD SHEET

No:..... Patient:..... Date:.....

Address:..... Tel:.....

Doctor:..... Pharmacist:.....

DAY 1	MORNING Time: _____			AFTERNOON/EVENING Time: _____		
	1st Reading	2nd Reading	3rd Reading	1st Reading	2nd Reading	3rd Reading
MAXIMUM						
MINIMUM						
PULSE						

DAY 2	MORNING Time: _____			AFTERNOON/EVENING Time: _____		
	1st Reading	2nd Reading	3rd Reading	1st Reading	2nd Reading	3rd Reading
MAXIMUM						
MINIMUM						
PULSE						

DAY 3	MORNING Time: _____			AFTERNOON/EVENING Time: _____		
	1st Reading	2nd Reading	3rd Reading	1st Reading	2nd Reading	3rd Reading
MAXIMUM						
MINIMUM						
PULSE						

DAY 4	MORNING Time: _____			AFTERNOON/EVENING Time: _____		
	1st Reading	2nd Reading	3rd Reading	1st Reading	2nd Reading	3rd Reading
MAXIMUM						
MINIMUM						
PULSE						

DAY 5	MORNING Time: _____			AFTERNOON/EVENING Time: _____		
	1st Reading	2nd Reading	3rd Reading	1st Reading	2nd Reading	3rd Reading
MAXIMUM						
MINIMUM						
PULSE						

DAY 6	MORNING Time: _____			AFTERNOON/EVENING Time: _____		
	1st Reading	2nd Reading	3rd Reading	1st Reading	2nd Reading	3rd Reading
MAXIMUM						
MINIMUM						
PULSE						

DAY 7	MORNING Time: _____			AFTERNOON/EVENING Time: _____		
	1st Reading	2nd Reading	3rd Reading	1st Reading	2nd Reading	3rd Reading
MAXIMUM						
MINIMUM						
PULSE						

If SBP ≥ 135 and/or DBP ≥85 mmHg REFER TO THE DOCTOR

Figure 2 HENFAC study registry sheet

Statistical analysis

The statistical programme SPSS® 22.0 for Windows® (IBM® New York, USA) was used. Qualitative and quantitative data are shown as percentages and mean ± standard deviation, respectively.

The chi-squared or Fisher test was used for analysis of qualitative variables. Student *t* and Mann-Whitney test was used for quantitative variables with a normal distribution and non-normal distribution, respectively. Quantitative variables were correlated by means of Pearson R or Spearman Rho. Statistical significance was set at $P<0.05$.

Ethics considerations

Both studies complied with the criteria required by Spanish legislation and were approved by the Clinical Research Ethics Committee of Hospital 12 de Octubre de Madrid.

All subjects gave their informed consent on the study to perform. Although the registry sheet collected some personal data for subjects, the data compiled in the MMM application were anonymized so as not to identify them individually. For the HENFAC study an information sheet was issued and written signed consent for the subject was collated. Collaborating pharmacists complied with that set out in the Spanish Organic Data Protection Law.

RESULTS

A total of 491 community pharmacists took part from all of Spain. They took 3406 blood pressure measurements with an average of 7 per pharmacist (3-15). A total of 4 participants did not consent to use of their data in the study, whereby the final sample was 3402 determinations of blood pressure.

Description of the sample

A total of 2107 (61.9%) and 1295 (38.1%) were women and men, respectively. Mean age was 56.6 ± 17.4 years (18 to 98). There were no significant differences between sexes.

Mean body mass index (BMI) was 26.7 ± 4.8 Kg/m^2 (14 to 56). This was higher in men (27.3 ± 4.2) than women (26.4 ± 5.1). The difference was statistically significant ($P<0.0001$).

Of the 2107 women, 43 (2.0%) were pregnant and of these, 8 (18.6%) had had high BP values prior to the pregnancy. **(Table 1)**

Table 1 Clinical Characteristics of subjects

	Women n (%)	Men n (%)	Total n (%)
Smoking			
Yes	366 (17.4)	308 (23.8)	674 (19.8)
No	1741 (82.6)	987 (76.2)	2728 (80.2)
Alcohol			
Regularly	148 (7.0)	547 (42.2)	695 (20.4)
Less than once a week	539 (25.9)	178 (13.8)	717 (21.1)
Never or almost never	1420 (68.1)	570 (44.0)	1990 (58.5)
With BP treatment			
Yes	616 (29.2)	431 (33.3)	1047 (30.8)
No	1491(70.8)	864 (66.7)	2355 (69.2)
Diabetes			
Yes	229 (10.9)	196 (15.1)	425 (12.5)
No	1878 (89.1)	1099 (84.9)	2977 (87.5)
Infarction			
Yes	60 (2.9)	86 (6.6)	146 (4.3)
No	2047 (97.1)	1209 (93.4)	3256 (95.7)
Stroke			
Yes	55 (2.6)	54 (4.2)	109 (3.2)
No	2052 (97.4)	1241 (95.8)	3293 (96.8)
Total	**2107 (100.0)**	**1295 (100.0)**	**3402 (100.0)**

Of the 3402 participants, 143 (4.2%) had never undergone blood pressure measurement. A total of 3259 (95.8%) had this taken at some time. Of these, 918 (27.0% of the total) had not been measured the past year. Of the 3259, 172 (5.3%) had already taken part in previously campaigns.

Of the participants who had undergone blood pressure measurement, 1991 (61.1%) took this themselves and 1268 (38.8%) had this measured by a healthcare professional. A total of 1047, 30.8% of the total surveyed were taking medicines for hypertension.

Measurement of blood pressure

The overall results of blood pressure and pulse measurements, after the determinations set out by the protocol, are shown in mean results in Table 2 according to sex. SBP and DBP values are higher in men. However, HR is higher in women **(Table 2)**.

mSBP and mDBP increase with age: Rho=0.3842 *P*<0.001 and Rho=0.0587 *P*<0.001 respectively.

DBP and pulse were determined: 372 (10.9%) in fasting and 3030 (89.1%) without fasting. There are no significant differences. The brands of the most commonly used measurement devices were: Omron® 2066 (68.7%), Hartmann® 550 (15.2%) and PIC® 114 (3.35%).

The results obtained shown as number and proportion of participants grouped by categories are shown in **Tables 3 and 4**.

The number of participants with normal BP (SBP<140 and DBP<90) was 2622 (77.1%). With one and/or two high blood pressure measurements (SBP ≥140 and/or DBP ≥90) 780 (22.9%). Of these, with treatment 478 (61.3%) and 302 (38.7%) with and without treatment, respectively. A total of 578 (54.3%) with anti-hypertensive treatment had BP monitored. With the two high measurements (SBP≥140 and DBP ≥90) this is 252 (7.4%). The number of participants with only high SBP ≥140 (isolated systolic hypertension) was 372 (10.9%). A total of 156 (4.6%) only had high DBP ≥90.

The number of subjects with pulse pressure (SBP-DBP) ≥60 mmHg was 636 (18.7%). The number of subjects with diabetes, SBP ≥140 mmHg and/or DBP ≥90 mmHg was 36 (8.5% of diabetics)

Analysis of SBP and DBP in regard to risk factors

Body mass index (BMI)

A direct relationship was revealed between mSBP and BMI (Rho=0.2830 *P*<0.0001), and also between mDBP and BMI (Rho=0.2594 *P*<0.0001).

Smoking

No differences were observed in mSBP for smokers. There was a difference for mDBP, higher in smokers 78.8 ± 11.2 vs 75.9 ± 11.3 *P*<0.0001 and also in mHR 75.5± 13.2 vs 71.9±13.4.

Table 2 Mean results of BP and HR determinations by sex

Sex	n (%)	mSBP* (m ± SD)	mDBP* (m ± SD)	mHR** (m ± SD)
Woman	2107 (61.9)	122.4 ± 18.6	75.1 ± 11.2	73.2 ± 13.2
Man	1295 (38.1)	129.2 ± 18.6	78.8 ± 11.1	71.7 ± 13.8
Total	3402 (100.0)	125.0 ± 18.0	76.5 ± 11.4	72.6 ± 13.4

*$P<0.001$; **$P<0.01$.

Table 3 Classification of SBP and DBP results separately

Category (27)	SBP		DBP	
	mmHg	n (%)	mmHg	n (%)
Optimal	<120	1351 (39.7)	<80	2193 (64.5)
Normal	120-129	743 (21.8)	80-84	474 (13.9)
Normal high	130-139	684 (20.1)	85-89	325 (9.6)
Grade 1 hypertension	140-159	506 (14.9)	90-99	319 (9.4)
Grade 2 hypertension	160-179	90 (2.7)	100-109	54 (1.6)
Grade 3 hypertension	≥180	28 (0.8)	≥110	37 (1.1)
		3402 (100.0)		3402 (100.0)

Table 4 Classification of combined BP results obtained

Category (27)	SBP mmHg		DBP mmHg	n (%)
Optimal	<120	and	<80	1198 (35.2)
Normal	120-129	and	80-84	1078 (31.7)
Normal high	130-139	and /or	85-89	891 (26.2)
Grade 1 hypertension	140-159	and /or	90- 99	684 (20.1)
Grade 2 hypertension	160-179	and /or	100-109	132 (3.9)
Grade 3 hypertension	≥180	and /or	≥110	52 (1.5)
Isolated Systolic Hypertension	≥140	and	<90	372 (10.9)

Use of anti-hypertensive medication

DBP figures were lower in subjects with treatment: 77.9 ±11.9 vs 82.0 ±11.8 *P*<0.0001. There were no statistical differences for SBP.

Of the 1047 subjects who were taking treatment for BP, 318 (30.1%) had SBP ≥140 and 160 (15.3%) DBP ≥90. A total of 569 (54.3%) had SBP <140 and DBP <90.

Of the 2355 not taking treatment for BP, 2053 (87.2%) had SBP <140 and DBP <90.

Measurement during the past year

Those that DID undergo BP measurement the past year had higher SBP: 126.9 ± 18.2 vs 120.9 ± 16.7 (*P*<0.001) than those who did NOT undergo BP measurement. This was not the case for DBP.

Other pathologies

In subjects with diabetes mSBP, mDBP and mHR values were higher than in non-diabetics. There were no statistically significant differences in mDBP. SBP/DBP values were both found to be higher than 140/90 mmHg in 36 (8.5% of diabetics). One of the two BP values (SBP≥140 and/or DBP≥90) were detected in 128 (30.1%). Of these, 20 (15.6%) had NO treatment.

Among those who had a heart attack or stroke SBP values are higher but lower for DBP and HR **(Table 5)**.

HENFAC Study

HBPM performed because of suspected masked hypertension

A total of 646 (19.0%) individuals had BP:130-139/85-89 mmHg; 61 agreed to undergo HBPM in their home.

Previous-mSBP: 133.0 ± 6.8 (102-151) vs mSBP-HBPM: 131.8 ± 11.6 (112-182) Spearman-Rho: 0.2812, *P* 0.0364.

Previous-mDBP: 80.0 ± 8.2 (58-102) vs mDBP-HBPM: 78.4 ± 7.2 (61-96), Spearman-Rho: 0.5270, *P*<0.0001 **(Tables 6-8)**.

Of the 9 (14.8%) patients with SBP/DBP-HBPM ≥135/≥85, 1 (11.1%) had diabetes; 1 (11.1%) cardiovascular disease; 3 (33.3%) smoked, 9 (100%) had overweight.

mHR-onset: 70.9 ± 12.8 (50-97) vs mHR-HBPM: 70.5 ± 10.1 (51-105), Spearman Rho: 0.5779, *P* <0.0001

Of the 25 (40.1%) with masked hypertension, 13 (52.0%) had overweight, 6 (24.0%) were diabetic, 7 (28%) smoked and 2 (8%) drank alcohol. There were no statistically significant differences with those who did not have masked hypertension.

Table 5 BP and pulse values according to various pathologies (m ± SD)

	Diabetes		Infarction		Stroke	
	No	Yes	No	Yes	No	Yes
mSBP	124.1 ± 17.9	131.5 ± 17.0*	124.8 ± 17.8	128.3 ± 17.8**	126.4 ± 19.9	128.2 ± 16.6
mDBP	75.9 ± 11.7	76.5 ± 11.3	76.7 ± 11.2	71.4 ± 12.2*	77.3 ± 12.5	74.9 ± 11.3
mHR	72.4 ± 13.2	74.3 ± 15.4**	72.8 ± 13.0	67.9 ± 20.4*	72.7 ± 13.3	71.2 ± 18.2

* *P*<0.001; ** *P*<0.05.

Table 6 Individuals with previous mSBP and mSBP HBPM

		mSBP-HBPM n (%)			Total
		<130 mmHg	130-139 mmHg	≥140 mmHg	
Previous mSBP n(%)	<130 mmHg	4 (6.6)	0 (0.0)	0 (0.0)	4 (6.6)
	130-139 mmHg	25 (45.0)	17 (27.9)	14 (23.0)	56 (91.8)
	≥140 mmHg	1 (1.6)	0 (0.0)	0 (0.0)	1 (1.6)
	Total	30 (49.2)	17 (27.9)	14 (23.0)	61 (100.0)

The percentages of each cell refer to the entire table. Chi^2= 5.6280, *P* =0.2287.

Table 7 Individuals with previous mDBP values and mDBP HBPM

		mDBP-HBPM n (%)			Total
		<85 mmHg	85-89 mmHg	≥90 mmHg	
Previous mDBP n(%)	<85 mmHg	33 (54.1)	4 (6.6)	1 (1.6)	38 (62.3)
	85 to 89 mmHg	14 (23.0)	4 (6.6)	2 (3.3)	20 (32.8)
	≥90 mmHg	2 (3.3)	0 (0.0)	1 (1.6)	3 (4.9)
	Total	49 (80.3)	8 (13.1)	4 (6.6)	61 (100.0)

The percentages of each cell refer to the entire table. Chi^2= 6.3812, *P*=0.1724.

Table 8 Individuals with mSBP and mDBP values with HBPM

		mDBP-HBPM n(%)		
		≥85 mm	<85 mm	Total
mSBP-HBPM n(%)	≥135 mm	9 (14.8)	13 (21.3)	22 (36.1)
	<135 mm	3 (4.9)	36 (59.0)	39 (63.9)
	Total	12 (19.7)	49 (80.3)	61 (100)

The percentages of each cell refer to the entire table. Chi^2= 9.8210, *P*=0.0017.

DISCUSSION

For the third consecutive year, in May 2019, coordinated by the International Society of Hypertension May Measurement Month (MMM19) was held globally; in which, globally, 1,508,130 subjects ≥18 years old were screened in 92 countries (20). In Spain, in collaboration with the Spanish Society of Hypertension-Spanish League Against Arterial Hypertension (SEH-LELHA), SEFAC performed this campaign whose results abstract was presented by Molinero et al (23). In this paper we report those corresponding to community pharmacies taking part.

The involvement of community pharmacists was again very high. A total of 491 partner pharmacist and SEFAC collaborators took part. The number of valid registrations obtained, 3402, attained a sufficient volume so as to guarantee drawing significant conclusions in regard to the setting of community pharmacy users, which once again is getting involved in a project with global scope and broad dissemination.

The study's main results reveal serious problems in managing arterial hypertension. Hypertension prevalence figures of 23% in an opportunistic sample such as the one analyzed here; virtually half of hypertensives in anti-hypertensive treatment with uncontrolled BP figures or 40% of people with masked hypertension, that is, undiagnosed hypertensives, tell us that an effort must be made in all health structures and that the collaboration of community pharmacists underused by the health system, could markedly contribute to its improvement.

Limitations

We may consider selection bias as a study limitation due to the recruitment of subjects among people who attend pharmacies. Because this is a population with demographic characteristics differentiated from the general population; whereby we cannot extend the conclusions to the Spanish population. However, as this is an opportunistic sample, inside a campaign aimed at increasing awareness on the importance of BP measurement, it is possible persons already concerned or who knew they had problems related to this would have been interested in taking part.

Sample characteristics

As in most studies performed in community pharmacies, the sample is comprised of a higher proportion of women (61.9%), similar to that in Europe (61.3%) and greater than in the rest of the world (51.6%) (20). During the global campaign BP was determined in different places, shopping centres, supermarkets and other similar health establishments as well as pharmacies. This might account for the differences. It would be appropriate in the future to try and access a higher proportion of men, who in general have a higher vascular risk and worse monitoring of BP (2,3).

The mean age of our sample (56.6 years) is also greater than the European age (51.2) and even more than the global age (45.8). The difference can be accounted for by the reason already mentioned and by the lower mean age especially on continents whose population has a lower life expectancy and higher birth rate (virtually 50% of subjects were from Asia) (20).

A total of 30.8% of those surveyed were taking BP medicines, whilst in the global survey the figure was 18.6% (20). The proportions of those declaring themselves as diabetics, having a history of acute myocardial infarction and stroke, being a smoker and consuming alcohol at least once a week, were also greater in Spain (20). In regard to the SNHS17, our results revealed a higher number of diabetics with a history of infarction and stroke (7.8%, 0.7% and 0.7% respectively in the SNHS17) (24). However, a lower number of smokers and drinkers (22.1% and 21.8% in the SNHS17, respectively) (25), which we believe again accounts for where the study was performed and the mean age of subjects.

A total of 27% of subjects had not measured BP the past year and 4% had never measured it. This is a much lower data than on a global level, in which the percentage of those who had never measured it turned out to be 32% (20). This suggests a greater concern by the population and better health service attention. However, at the same time and also in Spain, this has enabled reaching people who interact less with these services. There is a marked coincidence with the data collated in the SNHS17, albeit in regard to the population aged over 15, according to which the percentage of subjects who had never measured BP was 4.0%, and 27.7% for those who had not measured BP the past year (26).

Measurement of blood pressure

The mean results for BP determination (125.0/76.5 mmHg) and HR (72.6 bpm) in our sample may be considered within normal limits (1,27). They are much higher in men and BP increases markedly with age. There are minor differences with the result of the global survey (124.1/77.7 mmHg) in which SBP and DBP are lower and higher, respectively (20), and with the Di@betes studio, where mean SBP is higher (127.4 mmHg), but DBP is lower (75.2 mmHg) (3).

By analyzing BP measurements separately, they can be deemed normal (1,27) in 81.6% and 88.0% of subjects for SBP and DBP, respectively. However, if we consider them according to current criteria to define hypertension (1,21,27,28), that is, with at least one of the two high values, we detect 23% of subjects with high BP. In the global MMM19 (20) the percentage was higher, 34.0%, and in Europe this attained 43.6%.

The number of subjects who were taking BP medicines was 31%, and we have seen that of these, 46% had high BP. This means that only 54% of subjects in treatment with anti-hypertensive medication had BP monitored. Consequently, according to the MMM campaign criteria, which deems hypertensives those with BP ≥140/90 mmHg or taking an anti-hypertensive medicine, we can estimate the number of hypertensives as 1349 (1047+302) (39.7%), which falls between the results of the global campaign and our own continent (20). However, this is approximate to those found in the Spanish adult population in the Di@bet.es study (42.6%) (3), All of them are higher prevalence data than those reported by Mills et al (6) in a review of studies performed in 70 countries that represent 79.1% of the global population ≥20 years, which turned out to be 31.1%; whilst in the Geldsetzer et al study (29), corresponding to 44 low and middle income countries, the proportion of those diagnosed with HTA in over 15s was 39%. This reveals the problem does not only impact higher income countries but rather all kinds of populations.

However, the poor monitoring figures we have seen, with BP <140/90 mmHg in a little over half those treated with anti-hypertensive medication, suggests that while the number of hypertensives with treatment is high (71.2%) in regard to other countries: 54.7% in the global MMM19 (26), 45% in the Millman meta-analysis (8), 29.9% in Geldsetzner et al (29), BP monitoring is highly deficient, and strategies need to be set out to overcome the treatment inertia and make quick changes in managing hypertensive patients and their medication (8,9). The community pharmacist's training and her proximity to patients could be very useful in a new accountability model for this, in collaboration with the healthcare team, to attain the therapeutic aims set out.

Analysis of SBP and DBP in regard to risk factors

The relationship between BMP and BP figures for both SBP and DBP is close and significant. Both increase linearly when BMI rises, which also occurred in the global study (20) and is widely recognized in the literature (30,31). In regard to smoking a relationship is only detected for DBP and HR, which are much higher in smokers, whilst in the global study the minor increase also occurred for SBP (20).

In regard to the other associated pathologies, significant differences were detected for SBP and HR, higher in diabetics, results similar to the global MMM19 (20). However, these were not in accordance with the relationship of a history of infarction or stroke, which in our study presented higher SBP but lower DBP and HR, whilst in the global study both had lower BP (20).

Subjects who were taking antihypertensive treatment had much lower DBP figures (4.1 mmHg), but not SBP; whilst in the global study subjects with antihypertensive medication had both higher mSBP and mDBP in comparison to those not taking this (20).

In light of these data, we believe that as mentioned, the community pharmacist should play an important role in health education programmes and follow up of use of medicines that promote healthy lifestyles and more efficacy during treatments. Moreover, community pharmacists that collaborate with healthcare structures to attain better outcomes in managing these patients.

HENFAC Study (suspected masked hypertension)

In this MMM campaign from 2019 SEFAC, making use of general screening, and in collaboration with SEH-SELEHLA, the HENFAC study (Masked Hypertension in Community Pharmacy) was implemented, in which subjects presented normal-high BP (≥130/85 and <140/90 mmHg) according to the European guidelines for the management of hypertension in force on this date (22). The aim was identification, by means of determining BP outside the clinic and using HBPM as a system, those who might present BP values that would enable early diagnosis and commencing necessary measures to avoid uncontrolled clinical course.

The screening results revealed a number of subjects with BP between the thresholds defined as normal-high BP of 646 (19%). Of these 61 (9.4%) agreed to perform HBPM. SBP and DBP figures resulting from HBPM were much lower than those recorded previously during screening. This is coherent with the scope of the measurement. Moreover, the HR measured when performing HBPM was much lower than during screening.

Despite this, 25 subjects, 40% of those who agreed to undergo HBPM, led to SBP/DBP ≥135/85 mmHg. In this group we also find a high prevalence of cardiovascular risk factors recorded: overweight (52%), diabetes (24%) and smoking (28%). The prevalence of masked hypertension in subjects initially deemed normotensive was estimated at 15% to 31% (32,33). Our study revealed that this could be almost double the values measured for these estimates.

The small size of the sample that agreed to perform HBPM does not enable us to make categoric statements. However, this reveals without doubt that the use as criteria of screening for normal-high BP figures, which we believe may more suitably define a state of "pre-hypertension", has a high sensitivity for the alleged diagnosis of hypertension. In our study and in all certainty in systematic screening programmes that could be implemented in community pharmacies, their referral to the primary care doctor for evaluation, possible diagnosis and setting out of lifestyle and/or

pharmacotherapeutic measures may prevent complications arising from the hypertension situation. In these, again, the role of the community pharmacist might be of major use at times in which the saturation of public health services, overwhelmed by a growing care pressure, to which they do not respond fast enough or with the essential resources as claimed by Tranche et al (9); which is leading to a considerable deterioration in medical treatment.

CONCLUSIONS

For another year the May Measurement Month campaign in 2019 had an impressive turnout from both the public and pharmacists; this enabled disseminating the importance of periodic measurement of blood pressure.

Almost one-quarter (22.9%) of subjects had BP values greater or equal to 140/90 mmHg, whereby they can be deemed hypertensive.

More than half of subjects with high BP were not taking any treatment. Almost half of subjects with anti-hypertensive treatment had one or both high BP values.

The risk factors most closely related to high SBP and DBP were BMI, diabetes and age. SBP was higher in men, among those for whom BP had been measured the past year and in those with a history of myocardial infarction and stroke. DBP proved to be higher in smokers. However, this was not the case for SBP.

The performing of OBPM by protocol from the community pharmacy enabled confirming higher BP figures in over 40% of cases than those measured in a home setting. This would suggest a high prevalence of masked hypertension.

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Appendix. Data log sheet

HOJA DE REGISTRO

(Es obligatorio rellenar todos los campos)

SOBRE EL SITIO DE RECLUTAMIENTO

1	Ciudad/Pueblo:		Farmacia:
2	Fecha de la medición (día/mes/año)	/ /	
3	Hora de la medición (Formato de 24 h: 14:25)	:	

SOBRE DEL PARTICIPANTE

Código:	Nombre (Solo necesario si participa en el estudio HTA enmascarada)	Teléfono

4	Confirme que los datos registrados serán anonimizados y da permiso para que sean utilizados con fines académicos.		☐ Sí ☐ No
5	Edad (estimada si la desconoce)	_____	☐ Marque si se estima
6	Sexo	☐ Masculino ☐ Femenino ☐ Otro	
7	¿Está embarazada? ☐ Sí ☐ No	En caso de que la respuesta sea SÍ, ¿Ha tenido la presión arterial alta antes del embarazo? ☐ Sí ☐ No	
8	Etnia o raza	☐ Negro ☐ Blanco ☐ Asia del Sur ☐ Asia del Este ☐ Sudeste Asiático ☐ Arábico ☐ Mestizo ☐ Otra	
9	¿Alguna vez le han medido la presión arterial? ☐ Sí ☐ No	En caso de responder sí, ¿le han medido la presión arterial en los últimos 12 meses? ☐ Sí ☐ No	
10	¿Ha participado en MMM 2017 o/y 2018?		☐ Sí ☐ No
11	¿Algún profesional de la salud le ha diagnosticado, alguna vez, presión arterial elevada (excepto durante el embarazo)?		☐ Sí ☐ No
12	Actualmente, ¿está tomando algún medicamento para la presión arterial elevada (antihipertensivo)? ☐ Sí ☐ No ☐ No lo sabe	Si la respuesta es SÍ, ¿Cuántos medicamentos para la HTA está tomando? ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 o más ¿Toma estatinas? ☐ Sí ☐ No ¿Toma AAS? ☐ Sí ☐ No	
13	¿Cuánto tiempo hace que no ha visitado al médico o al enfermero? ☐ Menos de 1 mes ☐ Más de 1 mes ☐ Más de 6 meses ☐ Más de 1 año ☐ Nunca		
14	¿Está en ayunas?		☐ Sí ☐ No
15	¿Padece diabetes?		☐ Sí ☐ No
16	¿Fuma?		☐ Sí ☐ No
17	¿Consume alcohol?	☐ Nunca/casi nunca ☐ 1-3 veces al mes ☐ menos de 1 vez por semana	
18	¿Ha sufrido algún ataque al corazón?		☐ Sí ☐ No ☐ No lo sabe
19	¿Ha tenido alguna enfermedad cerebrovascular?		☐ Sí ☐ No ☐ No lo sabe

MEDIDAS

20	Peso (Estimado si no lo conoce). _____ kg	IMC	Perímetro de cintura_____ cm M: ☐ <80 ☐ 80-88 ☐ >88 H: ☐ <94 ☐ 94-102 ☐ >102	☐ Marque si se estima
21	Altura (Estimado si no lo conoce) _____ cm	_____		
22	¿Qué tipo de tensiómetro utiliza para medir la presión arterial?		☐ AUTOMÁTICO ☐ NO AUTOMÁTICO	
23	¿Cuál es el nombre del fabricante del dispositivo PA? *			
24	Brazo de medida	☐ derecho ☐ izquierdo		

	Presión arterial sistólica (PAS)	Presión arterial diastólica (PAD)	Ritmo cardíaco
25	1ª medida		
26	2ª medida		
27	3ª medida		
	PAS media dos últimas medidas:	PAD media de las dos últimas medidas:	Ritmo cardíaco medio de las dos últimas medidas:

SI PAS MEDIA ES 130-139 Y/O PAD MEDIA 85-89 EL SUJETO PUEDE ENTRAR EN EL ESTUDIO HTA ENMASCARADA

Si entra en el estudio HTA enmascarada recuerde anotar el nombre y el teléfono del participante.

Nota: Recuerde solicitar el consentimiento informado, y no registre en la web SEFAC ningún tipo de información personal que identifique al participante, como el nombre, dirección. Únicamente el código del paciente, que le servirá para identificarlo en la farmacia.

RETURN