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May Measurement Month 2019: an analysis of blood pressure screening results from Italy

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Cardiovascular (CV) diseases are burdened by high mortality and morbidity, being responsible for half of the deaths in Europe. Although hypertension is recognized as the most important CV risk factor, hypertension awareness, and blood pressure (BP) control are still unsatisfactory. In 2017 and 2018, respectively >10 000 and >5000 individuals took part in the May Measurement Month (MMM) campaign in Italy, of whom 30.6% and 26.3% were found to have high BP, respectively. To raise public awareness on the importance of hypertension and to collect BP data on a nationwide scale in Italy. In the frame of the MMM campaign, an opportunistic cross-sectional survey of volunteers aged ≥18 years was carried out in May 2019. BP measurement, the definition of hypertension, and statistical analysis followed the standard MMM protocol. Screening was conducted in multiple sites by health personnel. Among the 10 182 people screened (females: 52.3%, mean age 58 ± 16years) mean BP was 127/78 mmHg, and 3171 (31.1%) participants had arterial hypertension, of whom 62.1% were aware of being hypertensive. Diabetes, body mass index

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$>25\,kg/m^2$ were associated with higher BP and previous myocardial infarction with lower BP. For the third consecutive year we collected a nation-wide snapshot of BP control in a large sample of individuals. The high participation, with some yearly fluctuations likely due to the limitations of the sampling technique, confirms the power of this kind of health campaign in reaching a significant number of people to raise awareness on health topics.

Introduction

Cardiovascular (CV) diseases (CVDs) are responsible for more than half of all deaths across Europe.[1] Due to a combination of modifiable and non-modifiable factors, including unhealthy lifestyle and improved survival after acute events, their prevalence is on the rise.[1]

In 2016, the Italian Agency of Statistics (ISTAT) reported a yearly incidence of 367 deaths due to CVDs per 100 000 inhabitants, corresponding to a total of approximately 220 200 deaths.[2]

The effectiveness of global CV risk reduction in preventing events is universally accepted[3,4] and up to 80% of premature heart disease and stroke events are considered preventable.[5,6] Arterial hypertension represents the most important independent risk factor for CVDs,[7] with a reported prevalence in Italy of about 30% in the adult population,[8] with target blood pressure (BP) values reportedly reached in less than 50% of known hypertensives.[9] The Italian Society of Hypertension (SIIA) has been active over many years in raising awareness on this issue, taking part each year for more than a decade in World Hypertension Day, promoted by the World Hypertension League. Taking part in the May Measurement Month (MMM) initiative[10–12] was just the natural step forward, to reach as many people as possible and involve them in the fight against hypertension. In 2017 and 2018, thanks to the invaluable contribution of more than 300 investigators affiliated to the SIIA (see Supplementary material online, *Appendix 1*) and of the Italian Red Cross, we were able to reach >10 000 and >5000 people[10,13] respectively, an effort repeated also in year 2019.

Methods

MMM19 activities in Italy were conducted according to the same protocol as in previous years, with the support of the SIIA. Informed consent was obtained for each participant onsite. No personal information was requested, as all forms were anonymous. During the month of May 2019, 250 sites in Italy operated for a different number of days (from 1 to 5 days depending on the site), interviewing and measuring the BP of individuals aged 18 years and over who decided to stop by. Three seated BP measurements were recorded with an automated validated device (Omron M3 Comfort, HEM-7134-E, Omron Health Care; Japan) A total estimated number of 200 staff volunteers were involved in the campaign. Detailed

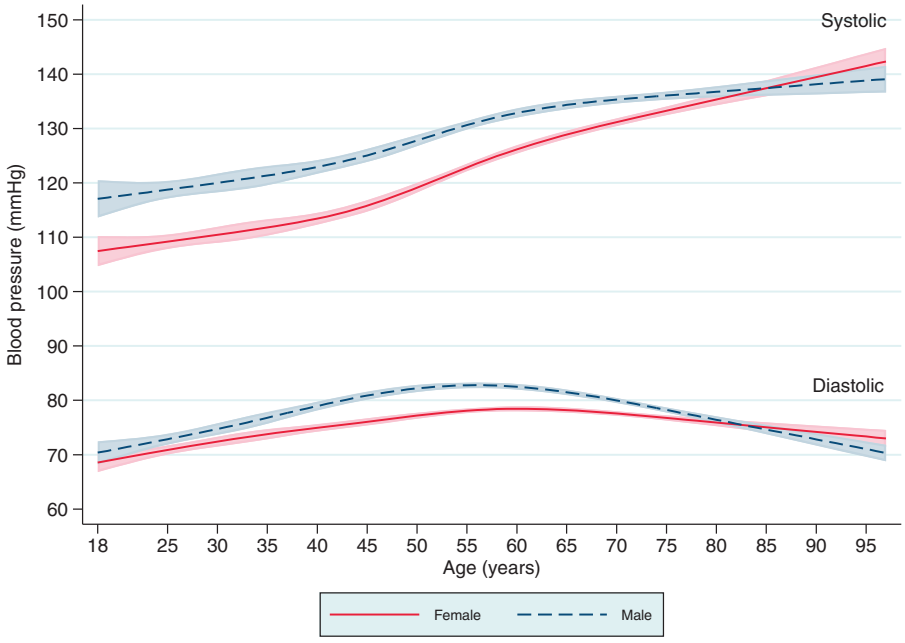

Figure 1 Blood pressure values by age and gender in the screened Italian population. Difference in mean blood pressure according to age and sex from linear regression model, excluding individuals receiving treatment.

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methods have already been described[13] Hypertension was defined as BP ≥140 and/or 90 mmHg based on the mean of the second and third BP readings or those on antihypertensive medication. Data were analysed by the MMM team with multiple imputation of missing BP readings according to a standard analysis plan.[12]

Results

Our sample consisted of 10 182 participants (females: 52.3%), with a mean (standard deviation) age of 58 (16) years. The absolute number of participants per age group increased by each decade after 39 years of age, reaching its maximum in age group >70 years (2629 subjects, 25.8% of the whole cohort).

Active smoking was reported by 1919 (18.8%), diabetes by 870 (8.5%), previous myocardial infarction by 714 (7.0%), and previous cerebrovascular accident by 351 (3.4%). Mean body mass index was 25.5 ± 4.5 kg/m^2, with 48.9% of subjects being of normal weight or underweight and 48.9% overweight or obese.

The mean BP (mean of reading 2 and 3) was 127/78 mmHg, and after imputation, 3171 (31.1%) participants were found to have hypertension. Both systolic and diastolic BP were lower in females over an age range between 18 and 80 years (*Figure 1*).

Of all 3171 participants with hypertension, 62.1% were aware of their condition and 16.2% were on antihypertensive medication. Of 513 participants on antihypertensive medication, 45.8% had their BP controlled; while of all 3171 participants with hypertension, 7.4% had their BP controlled.

Known hypertension, hypertension medication use, diabetes, and overweight/obesity were associated with higher BP values ($P < 0.0001$). Those with a previous myocardial infarction and those who were underweight (compared to those of a healthy weight) had lower mean BP values. (*Figures 2 and 3*).

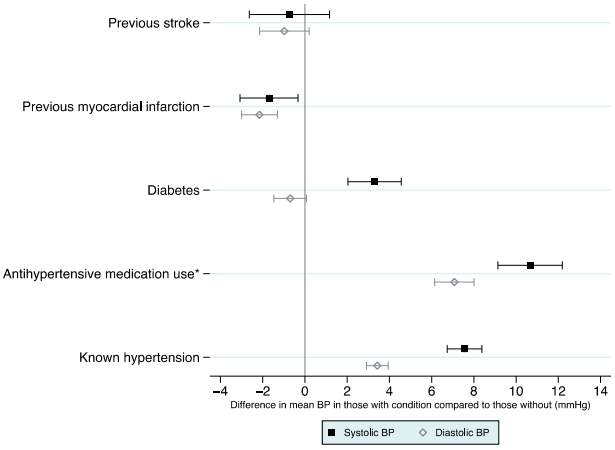

Figure 2 Mean blood pressure values changes in different cardiovascular risk factors. Difference in mean blood pressure in those with each comorbidity compared to those without from linear regression models adjusted for age, sex, and antihypertensive medication (antihypertensive medication adjusted for age and sex alone).

Discussion

Our data, obtained through a cross-sectional nation-wide survey, provides a contemporary update on BP values in a sample of the Italian population, adhering to the MMM19 initiative. The percentage of screened individuals found to be hypertensive (31.2%), is aligned with that reported during the MMM 2017 campaign (30.8% out of >10 000

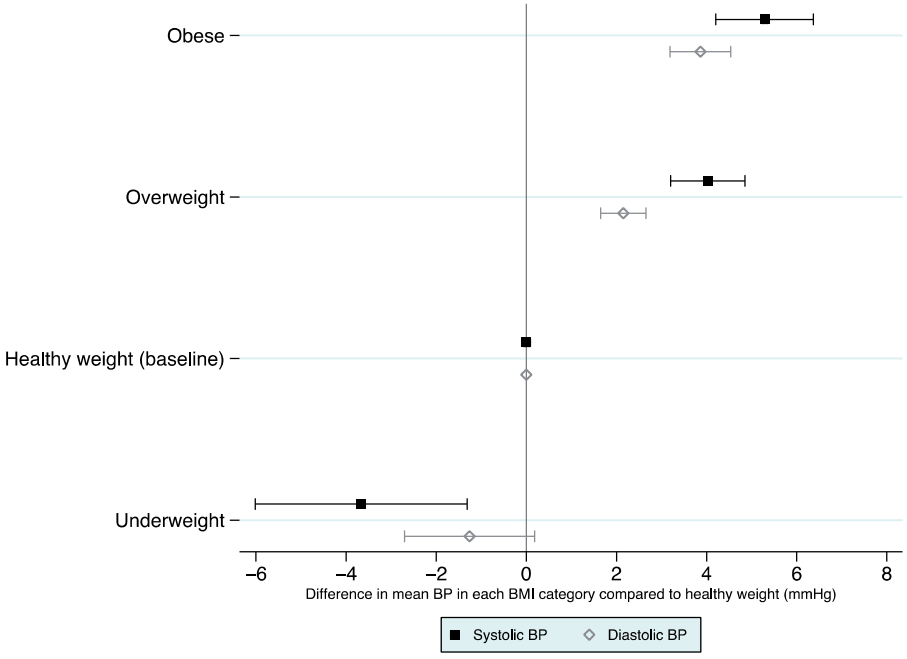

Figure 3 Mean blood pressure values changes by body weight. Difference in mean blood pressure in each body-mass index category compared to healthy weight from linear regression models, adjusted for age, sex, and antihypertensive medication.

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individuals),[13] but lower than observed in 2015 during the World Hypertension Day campaign (36% out of 8657 individuals).[9] The reported average BP values decreased slightly from 2015 (133/80 mmHg)[9] to 2017 (130/78 mmHg)[13] to 2018 (127/77 mmHg) and were then essentially stable in 2019 (127/78 mmHg). Interpretation of these data, especially in terms of comparability from one year to the other, should take into account a number of methodological limitations, typical of 'street epidemiology' (such as sampling bias, incomplete sample characterization, environmental factors unaccounted for, lack of specific cut-off values for BP measured in such circumstances, etc.). These limitations may likely explain the lower rate of individuals with high BP observed in 2018 (26%) compared to all the other years. On the other hand, the trend in reduction of average BP levels, irrespective of hypertension prevalence, seems to have been confirmed over the years. Indeed, over the years significant and continuing efforts have been made by SIIA to raise awareness of hypertension as a risk factor,[14] to increase its early diagnosis and improve BP control. Other survey findings are generally consistent with those of previous campaigns and are in line with available evidence, including the relationships between body weight and BP, increased prevalence of high BP values in diabetic patients, differences between females' and males' BP, which narrows as age increases.[15] Lower BP values in patients with previous myocardial infarction are likely due to larger use of CV drugs in secondary prevention.

By joining the MMM campaign, we have been able to spread awareness on BP levels and hypertension-related issues among a significant number of people, with the final goal of improving BP control and reducing CV morbidity and mortality.

Supplementary material

Supplementary material is available at *European Heart Journal Supplements* online

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Conflict of interest: none declared.

Data availability

Data are availabe on request addressed to the Corresponding Author.

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