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May Measurement Month 2019: analysis of blood pressure screening in Bishkek, Kyrgyzstan

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High blood pressure (BP) is one of the leading causes of death in Kyrgyzstan. The world's largest event in the field of increasing awareness of raised BP is the May Measurement Month (MMM) campaign. Kyrgyzstan joined MMM in 2019. The inclusion criteria for participants in the study were: age ≥18 years and providing informed consent. Hypertension was defined as the presence of systolic BP ≥140 mm Hg or diastolic BP ≥90 mm Hg based on the mean of the second and third of three sitting BP measurements or on treatment for hypertension. Most of the participants (96.9%) were surveyed inside two large shopping malls of Bishkek. The total number of people who took part in the screening was 2013. The mean age was 38.8 (± 12.6) years, and 1006 were women (50.0%) and 1007 men (50.0%). One-hundred eighty-four participants had hypertension (9.1%), of whom 59 (32.0%) were aware of their diagnosis, and hypertension was controlled in 25 participants (13.7%). The mean BMI was 24.0 (± 4.1) kg/m^2, 34 (1.7%) participants had diabetes mellitus, 12 (0.6%) had a history of myocardial infarction, 4 (0.2%) had a history of stroke, 314 (15.6%) were smokers. 41 (2.0%) drank alcohol 1–3 times a month, 46 (2.3%)—once per week. MMM screening allows us to gather up-to-date data on the prevalence, awareness and control of hypertension among volunteer screenees in Bishkek, Kyrgyzstan.

Introduction

Hypertension is one of the leading risk factors for the development of cardiovascular diseases (CVD) and complications.[1–3] According to previous data, the prevalence of hypertension in Kyrgyzstan is between 34 and 45%.[4,5] Based on the high prevalence and low control rate of hypertension in Kyrgyzstan, the Kyrgyz Society of Cardiology decided to join the May Measurement Month (MMM)[6–8] screening campaign in 2019. By participating in the MMM campaign, we hoped to help thousands of people find out their BP levels, raise awareness of high BP and identify other risk factors. In this article, we present the data collected during MMM19 in Bishkek, Kyrgyzstan.

Methods

The MMM campaign is a cross-sectional survey, initiated by the International Society of Hypertension in 2017. Kyrgyzstan joined the campaign in 2019. Study approval was obtained from the local ethics committee. Screening took place in two shopping malls and during the Social

Media Experts Meeting. A total of 2013 volunteers, aged 18–70 years, were screened during May 2019. Volunteers were trained in BP measurement and data collection according to the MMM protocol. Automatic BP monitors (Omron M6 Comfort) donated by OMRON were used for screening. Participants were recruited through social media advertising and banners were posted at the study site. BP was measured in a sitting position, three times, on the right arm. The mean value of the second and third measurements was used in analysis. An interval of 3-5 minutes was given between each measurement of BP. Hypertension was defined by the presence of systolic BP $\geq$140 mm Hg or diastolic BP $\geq$90 mm Hg or in those taking antihypertensive medication. Data collection was carried out using paper questionnaires. Subsequently, the data was entered into an spreadsheet form and sent to the MMM project management team, where statistical analysis were performed. Multiple imputation was used to impute the mean of the second and third BP reading if missing, based on the MMM global data, as described previously.[6] Linear regression was used to estimate the association between systolic and diastolic BP with other risk factors.

Results

The study included 2013 participants of whom 1006 were women (50.0%) and 1007 men (50.0%). The mean age of the participants was 38.8 ($\pm$ 12.6) years. Of all participants, 940 (46.7%) had their BP measured for the first time. Among all participants, hypertension was detected in 184 participants (9.1%) after imputation. Of the 184 participants with detected hypertension, 59 (32.0%) were aware of their diagnosis. Of the 184 participants with hypertension, 46 (25.0%) received antihypertensive therapy. Of those who received antihypertensive drugs, 32 (69.5%) were on single pill therapy, and 14 (30.5%) were on therapy with two or more pills. Of the 46 participants taking antihypertensive drugs, 25 (54.9%) had controlled BP (<140/90 mmHg) (*Table 1*).

The mean BMI was 24.0 ($\pm$4.1) kg/m^2, 534 (26.5%) were overweight, and 202 (10%) were obese. Based on the results of linear regression, both systolic and diastolic BPs were significantly higher among people who were overweight or obese and significantly lower in those who were underweight (*Table 2*).

Among the 2013 study participants, 34 (1.7%) reported the presence of diabetes mellitus, 12 (0.6%) suffered from previous myocardial infarction, 4 (0.2%) had a stroke, and 314 (15.6%) were current smokers. Forty-one participants (2.0%) drank alcohol one to three times per month, and 46 (2.3%) once or more per week. Screenees who currently smoked had on average a 2.0 mmHg higher mean systolic BP. For participants who drank alcohol one to three times per month had higher diastolic BP compared with non-drinkers (3.9 mmHg, $P = 0.02$). Among women screened, 21 (2.1%) were pregnant at the time of the study and unusually were found to have a 8.3 mmHg higher mean systolic BP than women who were not pregnant after adjusting for age and medication use. Thirty-eight (3.8%) women reported a history of hypertension during previous pregnancy but had no significant difference in their BPs compared to those without hypertension in a previous pregnancy.

Table 1 Total participants and proportions with arterial hypertension, awareness, on medication and with controlled blood pressure

Total participants	Number with hypertension	Proportion of all participants with hypertension (%)	Proportion of hypertensives aware (%)	Proportion of hypertensives on medication (%)	Proportion of those on medication with controlled BP (%)	Proportion of all hypertensives controlled (%)
2013	184	9.1	32.0	25.0	54.9	13.7

Table 2 Relationship of different weight groups with changes in blood pressure

Systolic/diastolic	BMI category	Change in BP compared to baseline (mmHg)	Standard error	P Value	95% confidence interval	
					Lower	Upper
Systolic	Underweight	-4.58	1.48	0.002	-7.49	-1.68
Systolic	Healthy weight (reference)	reference	-	-	-	-
Systolic	Overweight	2.66	0.76	<0.001	1.16	4.16
Systolic	Obese	6.29	1.13	<0.001	4.07	8.51
Diastolic	Underweight	-2.78	1.03	0.007	-4.79	-0.76
Diastolic	Healthy weight (reference)	reference	-	-	-	-
Diastolic	Overweight	2.41	0.55	<0.001	1.34	3.48
Diastolic	Obese	4.07	0.80	<0.001	2.50	5.64

Variables adjusted for age and sex (with an interaction) and antihypertensive medication
Underweight: <18.5 kg/m^2, Healthy weight: 18.5-24.9 kg/m^2; Overweight: 25.0-29.9 kg/m^2; Obese: $\geq$30.0 kg/m^2

The mean of the first and second BP readings (115.2/75.0 mmHg) was higher than the mean of the second and third BP readings (114.3/74.4 mmHg) among participants with all three BP measurements.

Discussion

In 2019, Kyrgyzstan took part in the MMM campaign for the first time. The study showed that of the 2013 participants screened, the proportion of participants with hypertension was 9.1%, the proportion of people who were aware of their diagnosis was 32.0%, and the proportion of all hypertensives who were controlled was 13.7%. At least half of the participants had not measured their BP in the past 12 months. This study showed low hypertension awareness among residents of Bishkek. This indicates the necessity to increase the awareness of the population of Kyrgyzstan about this disease. In comparison with previous studies, conducted in Kyrgyzstan.[4,5] MMM in 2019 showed a higher rate of hypertension control (54.9%) among those treated and a lower prevalence of hypertension. However, this may be because the study was performed only in the city of Bishkek, where the level of healthcare is higher than in other regions of Kyrgyzstan. It may also be related to the places where the research was carried out, mainly shopping centers. Such places are mostly visited by young people. To get a more complete picture of the true prevalence of hypertension in Kyrgyzstan, it is necessary to involve random sampling of all regions of the country.

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Data availability

All data are confidential and may only be provided with permission of authorities.

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