

## Quo vadis, prevencija kroničnih nezaraznih bolesti? Novi primjer iz Zagreba

### Prevention of Chronic Non-Communicable Diseases: Quo Vadis? A New Example from Zagreb

Mario Ivanuša<sup>1</sup>,  
Vedrana Škerk<sup>1\*</sup>,  
Marija Heinrich<sup>1</sup>,  
Nada Hrstić<sup>1</sup>,  
Goran Krstac<sup>1</sup>,  
Ivana Portolan Pajić<sup>2</sup>

<sup>1</sup>Poliklinika za prevenciju  
kardiovaskularnih bolesti  
i rehabilitaciju, Zagreb,  
Hrvatska

<sup>1</sup>Institute for Cardiovascular  
Prevention and Rehabilitation,  
Zagreb, Croatia

<sup>2</sup>Gradski ured za zdravstvo,  
Grad Zagreb, Zagreb,  
Hrvatska

<sup>2</sup>City Office for Health, City  
of Zagreb, Zagreb, Croatia

RECEIVED:  
December 10, 2015

ACCEPTED:  
December 22, 2015



**SAŽETAK:** Središnji događaj obilježavanja Svjetskog dana srca 2015. godine u Republici Hrvatskoj bila je otvorena javnozdravstvena akcija probira vodećih čimbenika kardiovaskularnog rizika u Zagrebu. Osobe s izrazito visokom učestalošću čimbenika rizika uključene su u javnozdravstveni program „Čuvari srca“ u kojemu se procjenjivao kardiovaskularni rizik i izdavane su preporuke za očuvanje zdravlja. Cilj je ovog rada izvijestiti o rezultatima te utvrditi važnost detekcije pojedinih čimbenika rizika u osoba s visokim kardiovaskularnim rizikom.

Sudionici su samonicijativno, nakon najava u medijima, pristupili besplatnoj detekciji čimbenika kardiovaskularnog rizika pri javnom okupljanju. Prema nahodanju zainteresiranih osoba zdravstveni su djelatnici određivali indeks tjelesne mase (ITM), mjerili vrijednosti arterijskoga tlaka (AT) te određivali glukozu i ukupni kolesterol iz kapilarne krvi. Prvih 100 sudionika akcije s izrazito visokom učestalošću pojedinih čimbenika rizika dobilo je pozivnicu za detaljnu evaluaciju i procjenu kardiovaskularnog rizika u Poliklinici za prevenciju kardiovaskularnih bolesti i rehabilitaciju u Zagrebu. Zasebno su prikazani rezultati obje akcije.

Otvorenoj javnozdravstvenoj akciji probira čimbenika kardiovaskularnog rizika odazvalo se 308 sudionika, i to 59,7 % žena i 40,3 % muškaraca. Prosječna dob sudionika iznosila je 68,8 ± 13,2 godine. Povišen AT (92,5 %) i povišen ITM (46,5 % prekomjerna tjelesna težina; 25,7 % pretilost) najčešći su čimbenici rizika. Izrazito povišena vrijednost ukupnog kolesterola registrirana je u 11,8 %, a izrazito povišena vrijednost glukoze u kapilarnoj krvi u 4,1 % sudionika. Od 100 pozvanih sudionika za akciju procjene kardiovaskularnog rizika odazvalo se njih 77 %, i to 75,3 % žena i 24,7 % muškaraca. Povišene vrijednosti AT-a imalo je njih 90,9 %, dislipidemiju 85,7 %, povećan opseg struka registriran je u 84,4 % sudionika, a njih 78,9 % imalo je povišen ITM. Dodatno smo analizirali rezultate 30 sudionika s otprije poznatom arterijskom hipertenzijom i dislipidemijom i utvrdili su kod njih prisutni čimbenici rizika povišen ITM (80,0 %), povišen opseg struka (76,7 %), povišene vrijednosti urata (23,3 %), C-reaktivnog proteina (16,7 %), kreatinina (10,0 %) i glukoze u krvi (10,0 %).

Zaključno, kod sudionika javnozdravstvene akcije najčešći su čimbenici rizika arterijska hipertenzija i povišen ITM. U sudionika s otprije poznatom arterijskom hipertenzijom i dislipidemijom uočili smo blag pristup kako glede neliječenja tih bolesti, tako i što se tiče korekcije nezdravih životnog navika i suboptimalnog medikamentnog liječenja.

**SUMMARY:** The central event of the World Heart Day 2015 in Croatia was an open public-health initiative screening for leading cardiovascular risk factors in the city of Zagreb. Individuals with very high risk factor prevalence were accepted into the “Guardians of the Heart” program that assessed cardiovascular risk and offered advice on health. The goal of this article is to report on these results and demonstrate the significance of detecting specific risk factors in individuals with high cardiovascular risk.

After an announcement in the media, participants voluntarily applied for free assessment of cardiovascular risk factors during the public event. For interested citizens, health professionals determined the body-mass index (BMI), measured blood pressure (BP), and determined glucose levels and total cholesterol from capillary blood. The first 100 participants with extremely high prevalence of individual risk factors were invited to further detailed evaluation and cardiovascular risk assessment at the Institute for Cardiovascular Prevention and Rehabilitation in Zagreb. The results of both actions are presented here.

The open public-health action was attended by 308 participants, of whom 59.7% were women and 40.3% men. The average age was 68.8±13.2 years of age. Elevated BP (92.5%) and BMI (46.5% overweight, 25.7% obese) were the most common risk factors. Highly elevated total cholesterol levels were registered in 11.8% participants, and highly elevated glucose levels in the capillary blood in 4.1%. Of the 100

participants invited to detailed cardiovascular risk assessment, 77% responded, of whom 75.2% were women and 24.7% men. Increased BP levels were found in 90.9% of these respondents; dyslipidemia in 85.7%, increased waist size in 84.4%, and 78.9% had elevated BMI. We performed an additional analysis on the results of 30 participants with existing hypertension and dyslipidemia and found elevated risk factors, including elevated BMI (80.0%), waist size (76.7%), urate levels (23.3%), C-reactive protein (16.7%), creatinine (10.0%), and blood glucose levels (10.0%).

The most common risk factors in the participants of this public-health action were arterial hypertension and increased BMI. In participants with existing hypertension and dyslipidemia we noted a dismissive approach to these risk factors, both in the sense of non-treatment

**KLJUČNE RIJEČI:** čimbenici kardiovaskularnog rizika, probir, Svjetski dan srca.

**KEYWORDS:** cardiovascular risk factor, screening, World Heart Day.

**CITATION:** *Cardiol Croat.* 2015;10(11-12):274–282. | **DOI:** <http://dx.doi.org/10.15836/ccar2015.274>

**\*ADDRESS FOR CORRESPONDENCE:** Vedrana Škerk, Poliklinika za prevenciju kardiovaskularnih bolesti i rehabilitaciju, Zagreb, Croatia.

Phone: 385-1-4612-346; Fax: +385-1-4612-343 / E-mail: [vedranaskerk@gmail.com](mailto:vedranaskerk@gmail.com)

**ORCID:** Mario Ivanuša, <http://orcid.org/0000-0002-6426-6831> / Vedrana Škerk, <http://orcid.org/0000-0002-9428-431X>

Marija Heinrich: <http://orcid.org/0000-0002-7107-3405> / Nada Hršćić: <http://orcid.org/0000-0001-6050-7573>

Goran Krstajić: <http://orcid.org/0000-0003-0427-7229> / Ivana Portolan Pajić: <http://orcid.org/0000-0001-6407-9107>

## Uvod

Među zemljama članicama Europske unije Republika Hrvatska pripada skupini zemalja s vrlo visokim rizikom od kardiovaskularnih bolesti (KVB). Iako i dalje gotovo svaka druga osoba umire od neke KVB, dobra je vijest što se stopa smrtnosti od KVB-a tijekom proteklih deset godina u Hrvatskoj postupno smanjuje<sup>1,2</sup> zahvaljujući pravodobnom, kvalitetnijem i na dokazima utemeljenom liječenju koronarne bolesti srca (KBS) te preventivnim i javnozdravstvenim aktivnostima.

Sa svrhom prosvjeđivanja opće populacije o važnosti kardiovaskularnog zdravlja, čimbenicima rizika i prevenciji KVB-a od 2000. godine, na dan 29. rujna obilježava se Svjetski dan srca. Svake godine taj dan ima drukčiju temu i slogan, koji odražavaju ključnu tematiku glede zdravlja srca. Svjetska kardiološka federacija sloganom za 2015. godinu „Odabir za zdravo srce, za svakoga i svagdje“ usmjerila je pozornost populacije na promjenu postojećih i izgradnju novih navika koje će stvoriti zdravo okruženje u domu ili na radnom mjestu. Uspjeh javnozdravstvene akcije u povodu Svjetskog dana srca ovisi o angažmanu nacionalnih organizacija u obilježavanju istog<sup>3</sup>.

Središnji događaj obilježavanja Svjetskog dana srca 2015. godine u Republici Hrvatskoj bila je javnozdravstvena akcija strukturiranog probira vodećih čimbenika za nastanak KVB-a (visoki arterijski tlak, poremećaj lipida, pretilost i dijabetes) u Zagrebu. Pod pokroviteljstvom Grada Zagreba i Medicinskog fakulteta Sveučilišta u Zagrebu akciju su organizirali Zaklada „Hrvatska kuća srca“ i Hrvatsko kardiološko društvo u suradnji s Hrvatskom udrugom kardioloških medicinskih sestara. Osobe kojima su utvrđene izrazito visoke vrijednosti čimbenika kardiovaskularnog rizika uključene su u program promicanja kardiovaskularnog zdravlja „Čuvari srca“ koji je tijekom rujna 2015. godine pokrenula Zaklada „Hrvatska kuća srca“ sa svrhom ranog otkrivanja KVB-a te poboljšanja kvalitete i duljine života. Aktivnosti su programa, nakon adekvatne pripreme, uključile detaljan probir nepromjenjivih i promjenjivih čimbenika, procjenu kardiovaskularnog rizika i izdavanje preporuka za očuvanje zdravlja koje oboljelima daje

## Introduction

Among European Union member states, Croatia is in the group of countries with very high risk of cardiovascular diseases (CVD). Although every second death in Croatia is caused by CVD, the good news is that the mortality rate from CVD has gradually dropped over the last ten years in Croatia<sup>1,2</sup>, thanks to timely, high-quality, and evidence-based treatment of coronary heart disease (CHD) and preventive and public-health initiatives.

The goal of World Heart Day, held on September 29, is to educate the general population on the importance of cardiovascular health, risk factors, and CVD prevention. The World Heart Day has a different slogan and topic every year, reflecting a key heart-related health issue. For 2015, the World Heart Federation chose the slogan “Healthy heart choices for everyone, everywhere”, calling attention to the need to change existing habits and form new ones to create a healthy environment in the home or workplace. The success of the public-health initiative on World Heart Day depends on the efforts of local national organizations in arranging the event<sup>3</sup>.

The central event of World Heart Day in Croatia in 2015 was the systematic screening for leading risk factors for CVD (high blood pressure, lipid disorders, obesity, and diabetes) that took place in Zagreb, the capital city. Under the sponsorship of the City of Zagreb and the University of Zagreb School of Medicine, the action was organized by the foundation Croatian Heart House and the Croatian Cardiac Society in cooperation with the Croatian Association of Cardiology Nurses. Participants who were found to have extremely high cardiovascular risk values were included into the “Guardians of the Heart” program started in September, 2015 by the Foundation Croatian Heart House to promote cardiovascular health through early CVD detection and improvement in length and quality of life. After proper preparation, the program consisted of detailed screening for modifiable and unmodifiable risk factors, cardiovascular risk assessment, and issuing health recommendations by a team of health professionals with years of experiences in therapeutic education of cardiovascular patients.

The aim of this article is to report the results of the systematic screening for cardiovascular risk in the city of Zagreb and

tim zdravstvenih djelatnika s višegodišnjim iskustvom u terapijskoj edukaciji kardiovaskularnih bolesnika.

Ciljevi su ovog rada izvijestiti o rezultatima provedenoga strukturiranog probira kardiovaskularnih čimbenika rizika u stanovnika Grada Zagreba te utvrditi važnost detekcije pojedinih čimbenika u javnozdravstvenim akcijama u osoba s visokim kardiovaskularnim rizikom.

## Pacijenti i metode

Sudionici su samonicijativno, nakon najava u tiskanim i elektroničkim medijima, pristupili besplatnoj detekciji čimbenika kardiovaskularnog rizika provedenoj u javnozdravstvenoj akciji na Trgu Petra Preradovića u Zagrebu. Zainteresiranim osobama zdravstveni su djelatnici organizirano mjerili tjelesnu težinu i visinu te određivali indeks tjelesne mase (ITM). Automatskim tlakomjeračem mjerile su se vrijednosti arterijskoga tlaka (AT). Iz kapilarne krvi mjeračima s pomoću testnih traka određeni su glukoza i ukupni kolesterol. Sudionici akcije imali su priliku samostalno izabrati između kontrole pojedinih ili svih čimbenika kardiovaskularnog rizika, kao i dobiti savjete prisutnih zdravstvenih djelatnika i tiskane edukativne materijale iz područja prevencije KVB-a.

Prvih 100 sudionika akcije s izrazito visokom učestalošću pojedinih čimbenika rizika, a poglavito onima s visokim vrijednostima ukupnog kolesterola ( $\geq 7,0$  mmol/L) zbog sumnje na obiteljsku hiperkolesterolemiju, onima s III. stupnjem arterijske hipertenzije (sistolički  $> 180$  i/ili dijastolički tlak  $> 110$  mmHg) ili visokim vrijednostima glukoze ( $> 11,1$  mmol/L) uručene su pozivnice za besplatno sudjelovanje u ciljanoj javnozdravstvenoj akciji. Na pozivnici je bio termin za detaljnu evaluaciju čimbenika kardiovaskularnog rizika u Poliklinici za prevenciju kardiovaskularnih bolesti i rehabilitaciju u Zagrebu. Skrenuta je pozornost na potrebu dolaska natašte, nakon neuzimanja jela i pića (osim vode) barem tijekom zadnjih osam sati. U dogovorenom su se terminu utvrdili demografski podatci, izmjereni su ITM, opseg struka, vrijednosti AT-a i frekvencije srca. Uzeti su detaljni anamnestički podatci o pušenju cigareta te o prisutnosti arterijske hipertenzije (AH), KBS-a, dislipidemije, dijabetesa i liječenju medikamentima. Svim sudionicima akcije standardnim su postupkom iz venske krvi u biokemijskom laboratoriju određene vrijednosti ukupnog kolesterola, LDL kolesterola, HDL kolesterola, triglicerida, glukoze, C-reaktivnog proteina, kreatinina, kalija i urata. Prema učinjenim nalazima kardiolog je procijenio kardiovaskularni rizik i savjetovao potrebu za daljnjom obradom i/ili liječenjem. Svim je sudionicima izdan pisani nalaz s rezultatima svih mjerenja i preporukama za poboljšanje zdravlja za daljnji kontakt s liječnikom obiteljske medicine.

Rezultati su za dvije skupine ispitanika prikazani zasebno. Najprije su prikazani rezultati otvorene javnozdravstvene akcije probira kardiovaskularnih čimbenika na javnom prostoru. Potom su prikazani rezultati ciljane akcije procjene kardiovaskularnog rizika u ustanovi sekundarne zdravstvene zaštite.

Podatci dobiveni prebrojavanjem opisani su kao apsolutni brojevi i relativne frekvencije i prikazani su u skupinama ovisno o spolu. Podatci dobiveni mjerenjem opisani su uporabom minimalne i maksimalne vrijednosti te aritmetičke sredine.

establish the significance of detecting specific risk factors in persons with high cardiovascular risk.

## Patients and Methods

After announcements in the media, participants voluntarily applied for free assessment of cardiovascular risk factors during the public event on the Petar Preradović Square in Zagreb. Interested persons had their body-mass index (BMI) measured in an organized fashion by health professionals. Automatic blood pressure monitors were used to measure blood pressure (BP). Glucose and total cholesterol were determined from capillary blood using test strips. Participants were allowed to choose which cardiovascular risk factors they wanted to measure and were offered advice from health professionals as well as printed materials on CVD prevention.

The first 100 participants with extremely high incidence of specific risk factors, especially those with high total cholesterol levels ( $\geq 7.0$  mmol/L) due to suspected familial hypercholesterolemia, those with stage III arterial hypertension (systolic BP  $> 180$  mmHg or diastolic BP  $> 110$  mmHg), or with high glucose values ( $> 11.1$  mmol/L), received a free invitation to participate in a targeted public-health action. The invitation listed the date when they could receive a detailed evaluation of cardiovascular risk factors at the Institute for Cardiovascular Prevention and Rehabilitation in Zagreb. Participants have been advised to abstain from eating eight hours prior to having their blood drawn (except water). The evaluation included taking demographic data, BMI and waist size measurement, measuring BP and heart rate, and taking a detailed history on smoking and arterial hypertension (AH), CHD, dyslipidemia, diabetes, and previous drug treatments. All participants had a blood sample taken from a vein using the standard procedure in a biochemical laboratory, to determine total cholesterol values, low-density lipoprotein (LDL) cholesterol, high-density lipoprotein (HDL) cholesterol, blood triglycerides, glucose levels, C-reactive protein (CRP) levels, and creatinine, potassium, and urate levels. Based on the results, a cardiologist assessed the cardiovascular risk and advised on further tests and/or treatment. All participants received a written assessment with the results of all the measurements and recommendations for health improvement as well as further contact with a family medicine physician.

The results are shown separately for the two groups of participants. First are the results of the open public-health screening for cardiovascular risk factors, followed by the results of the targeted cardiovascular risk assessment in the secondary healthcare institution.

Frequency data are presented as absolute numbers and relative frequencies, according to gender. Continuous data are presented as minimal and maximal values and arithmetic means.

## Results of the open public-health screening for cardiovascular risk factors

The public-health action on the Petar Preradović Square in Zagreb had 308 participants, of whom 184 (59.7%) were women and 124 (40.3%) men. The average age was  $68.8 \pm 13.2$  years of

## Rezultati otvorene javnozdravstvene akcije probira čimbenika kardiovaskularnog rizika

Javnozdravstvenoj akciji na Trgu Petra Preradovića u Zagrebu odazvalo se 308 sudionika, 184 (59,7 %) žena i 124 (40,3%) muškarca. Prosječna životna dob ispitanika iznosila je 68,8 ± 13,2 godina (podatci poznati za 302 ispitanika; 181 žena i 121 muškarac). Muškarci su bili prosječno tri godine stariji od žena (71,7 ± 12,2 prema 68,5 ± 13,8). Najmlađi sudionik akcije ženskog spola imao je 7, a najstariji 92 godine. Kod muškaraca najmlađi je sudionik akcije imao 13, a najstariji 93 godine.

Vrijednost AT-a bila je najčešće detektirani čimbenik rizika koji je izmjeren u 285 (92,5 %) sudionika akcije, od kojih je bilo 177 (62,1 %) žena i 108 (37,9 %) muškaraca. Povišene vrijednosti AT-a (sistolčki > 140 i/ili dijastolički > 90 mmHg) registrirane su u njih 230 (80,7 %), i to kod 90 muškaraca i 140 žena, odnosno u 83,3 % muškaraca i 79,1 % žena kojima je AT bio izmjeren. Stupanj III. AH-a registriran je u 48 (15,6 %) sudionika akcije koji su izmjerili AT, i to 20 (16,1 %) muškaraca i 28 žena (15,2 %).

Vrijednost glukoze iz kapilarne krvi bila je određena u 245 ispitanika, od kojih je njih 10 (4,1 %) imalo vrijednosti više od 11,1 mmol/L koje upućuju na šećernu bolest.

Ukupni kolesterol iz kapilarne krvi bio je izmjeren u 119 sudionika akcije, od kojih je vrijednost ≥ 7,0 mmol/L imalo njih 14 (11,8 %). U 12 (10,1 %) sudionika vrijednost ukupnog kolesterola nije bila mjerljiva.

Vrijednost ITM-a izmjerena je najrjeđe od svih čimbenika rizika, u ukupno 101 sudionika. Raspodjelu indeksa tjelesne mase prikazuje **slika 1**. Prekomjerna tjelesna težina registrirana je češće u muškaraca nego u žena (57,9 % prema 30,2 %). Pretilost je bila rjeđe registrirana u muškaraca nego u žena (18,4% prema 44,2%).

## Rezultati ciljane javnozdravstvene akcije procjene kardiovaskularnog rizika

Od 100 pozvanih sudionika s izrazito visokom učestalošću pojedinih čimbenika rizika kojima je uručena pozivnica za ciljanu javnozdravstvenu akciju procjene kardiovaskularnog rizika u ustanovi sekundarne zdravstvene zaštite odazvalo se njih 77 (77 %), i to 58 žena (75,3%) i 19 muškaraca (24,7 %).

Prosječna životna dob sudionika bila je ista (70,7 ± 9,2 godina za žene prema 70,7 ± 9,8 godina za muškarce). Najmlađa sudionica akcije imala je 26, a najstarija 89 godina. Najmlađi je muškarac imao 43, a najstariji 86 godina.

Raspodjela ITM-a detaljno je prikazana na **slici 2**. Broj osoba s normalnim ITM-om nije ovisio o spolu (5/19; 26,3 % za muškarce prema 16/58; 27,6 % za žene).

Opseg struka bio je uredan samo u 13,8 % (8/58) žena i 21,1 % (4/19) muškaraca. Prosječna vrijednost opsega struka bila je slična u sudionika neovisno o spolu (98,8 za žene prema 99,9 cm za muškarce).

Povišene vrijednosti AT-a registrirane su pak u 90,9 % sudionika (52/58; 89,7 % za žene prema 18/19; 94,7 % za muškarce), i to ponajviše vrijednosti I. i II. stupnja AH-a. Stupanj III. AH-a registriran je samo u 9,6 % (5/52) ispitanica ženskog spola. Izolirana sistolička hipertenzija registrirana je samo u 5,8 %

age (data known for 302 participants, 181 women and 121 men). The men were on average three years older than the women (71.7±12.2 versus 68.5±13.8). The youngest female participant was 7 years of age, and the oldest was 92 years old. In men, the youngest participant was 13, and the oldest was 93 years old.

BP measurement was the most chosen risk factor measurement among the participants. Specifically, BP was checked in 285 participants (92.5%), of whom 177 (62.1%) were women and 108 (37.9%) were men. Elevated BP values (systolic pressure >140 and/or diastolic >90 mmHg) were identified in 230 (80.7%) participants, of whom 90 were men and 140 women. Considering the results of the measurements, 83,3% of male and 79.1% of female participants, had elevated BP values. Stage III AH was found in 48 (15.6%) participants with BP, of whom 20 (16.1%) were men and 28 (15.2%) were women.

Capillary blood glucose levels were measured in 245 participants, of which 10 (4.1%) had values above 11.1 mmol/L that indicate diabetes.

Total cholesterol in fingerstick capillary specimens was measured in 119 participants, of which 14 (11.8%) had values ≥7.0 mmol/L, and in 12 (10.1%) total cholesterol was not measurable.

BMI values were measured in 121 participants, least commonly of all risk factors evaluated. BMI distribution is shown in **Figure 1**. Being overweight was more common in men than in women (57.9% versus 30.2%). Obesity was found less commonly in men than in women (18.4% versus 44.2%).

## Results of the targeted public-health evaluation of cardiovascular risk factors

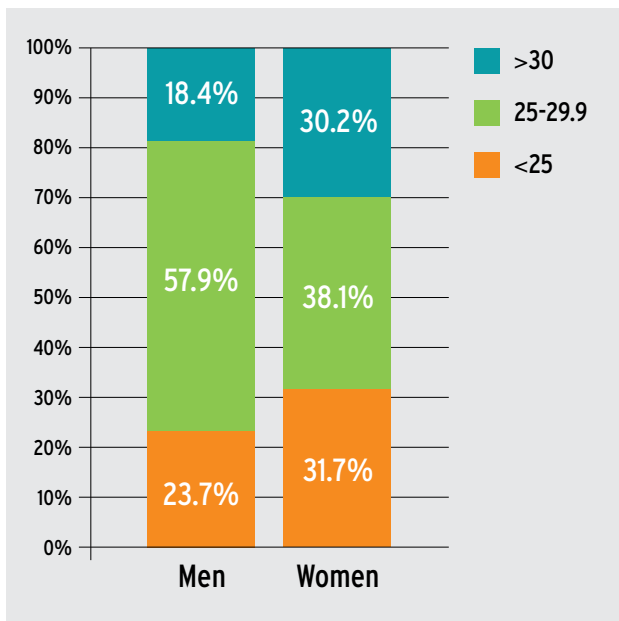
Of the 100 participants invited for further targeted cardiovascular risk evaluation in a secondary healthcare institution due to extremely high incidence of particular risk factors, 77 (77.0%) responded to the invitation, of whom 58 (75.3%) were women and 19 (24.7%) were men. The average age of these respondents was the same (70.7±9.2 for women versus 70.7±9.8 for men). The youngest female participant was 26, and the oldest was 89 years of age. The youngest male participant was 43, and the oldest 86 years of age.

BMI distribution is shown in detail in **Figure 2**. The percentage of participants with normal BMI was not associated with gender (5/19; 26.3% in men versus 16/58; 27.6% in women).

Waist size was normal in just 13.8% (8/58) women and 21.1% (4/19) men. Average waist size values were similar regardless of gender (98.8 cm in women versus 99.9 cm in men).

Elevated BP was found in 90.9% of participants (52/58; 89.7% in women versus 18/19; 94.7% in men), mostly stage I and II AH. AH stage III was found in only 9.6% (5/52) of female participants. Isolated systolic hypertension was found only in 5.8% (3/52) women. Of the participants with increased AP, as many as 87.1% (61/70) were already aware of their AH (48/52; 92.3% of women versus 13/18; 72.2% men). Of these, 67% were already receiving antihypertensive treatment, but only 6 participants had optimal BP values. Analyzing the association between AH and BMI, we found that 58% of participants with AH were also obese.





**FIGURE 1.** Body-mass index according to gender in the participants of the open public-health initiative on the Petar Preradović Square in Zagreb.

(3/52) žena. Od sudionika s povišenim vrijednostima AT-a, čak njih 87,1 % (61/70) već je znalo za AH (48/52; 92,3 % za žene prema 13/18; 72,2 % za muškarce). Od tog se broja njih čak 67 % koristilo antihipertenzivnom terapijom, no samo 6 osoba imalo je optimalne vrijednosti AT-a. Analizirajući povezanost AH-a i ITM-a, utvrđeno je da je 58 % sudionika s AH-om pretilo.

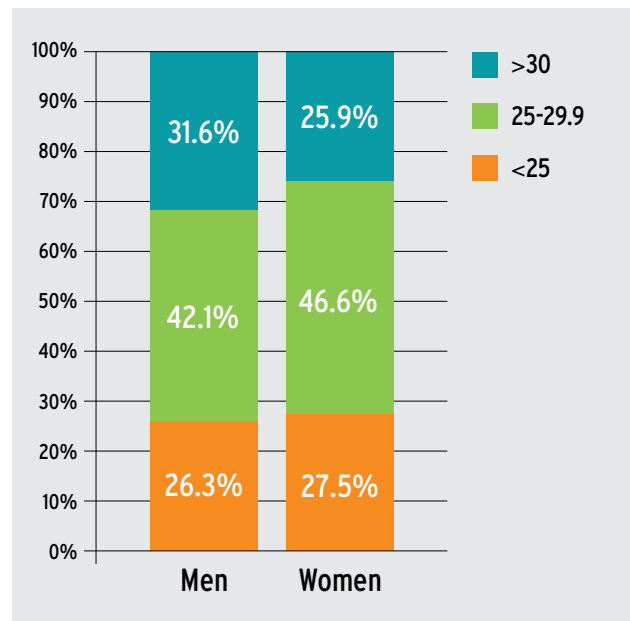
Vrijednosti frekvencije srca bile su uredne u većine (prosječna frekvencija 71/min za muškarce prema 74/min za žene), a povišen broj otkucaja srca registriran je samo u 2 (3,4 %) sudionice.

U troje sudionika (3/77; 3,9 %) dobiven je pozitivan anamnestički podatak o preboljenom infarktu miokarda (2/58; 3,4% za žene prema 1/19; 5,3% za muškarce).

Pozitivan anamnestički podatak o pušenju cigareta bio je registriran u samo dvoje (2,6 %) sudionika, i to jednog muškarca i jedne žene.

Pozitivan anamnestički podatak za dislipidemiju dobiven je za 51 (66,2 %) sudionika (11; 57,9% muškaraca prema 45; 77,6 % žena). Međutim, u laboratorijskim nalazima dislipidemija je registrirana u čak 85,7 % (66/77) sudionika, i to kod svih muškaraca i kod 81 % (47/58) žena. Vrijednost ukupnog kolesterola viša od 7,0 mmol/L utvrđena je u 11 (10 žena i 1 muškarca) sudionika akcije. Spomenuti se muškarac posebno istaknuo vrlo visokim vrijednostima lipida (ukupni kolesterol 9,8 mmol/L, a trigliceridi 8,3 mmol/L, dok LDL nije određen sukladno izrazito lipemičnom serumu).

Ukupno je 10 (13 %) sudionika imalo pozitivne anamnestičke podatke za dijabetes, od čega 8 (13,8 %) žena i 2 (10,5 %) muškarca. Polovica dijabetičara (4 žene i 1 muškarac) imali su vrijednost glukoze u krvi višu od 7,8 mmol/L, što upućuje na nereguliranu šećernu bolest.



**FIGURE 2.** Body-mass index according to gender in participants of the targeted public-health evaluation of cardiovascular risk factors at the Institute for Cardiovascular Prevention and Rehabilitation in Zagreb.

Heart rate frequencies were normal in most participants (average frequency 71/min in men versus 74/min in women), and elevated heart rates were found in only 2 (3,4%) participants.

Three (3/77; 3,9%) participants have had previous myocardial infarction (2/58; 3,4% women versus 1/19; 5,3% men).

Medical history positive for cigarette smoking was found in only 2 (2,6%) participants, one man and one woman.

Positive medical history for dyslipidemia was found in 51 (66,2%) participants (11; 57,9% men versus 45; 77,6% women). However, laboratory findings showed dyslipidemia in as many as 85,7% (66/77) participants, namely in all of the men and 81,0% (47/58) women. Total cholesterol levels above 7,0 mmol/L were found in 11 participants (10 women and 1 man). The man in this group stood out because of his extraordinarily high lipid values (total cholesterol 9,8 mmol/L, triglycerides 8,3 mmol/L, while LDL levels were not established because of extremely lipemic serum).

A total of 10 (13,0%) participants had a history of diabetes, of whom 8 (13,8%) were women and 2 (10,5%) men. Half of these diabetics (4 women and 1 man) had blood glucose levels above 7,8 mmol/L, indicative of unregulated diabetes.

The prevalence of increased creatinine, urate, and CRP levels in participant groups according to gender is shown in **Table 1**. All participants with increased creatinine values were additionally assessed for glomerular filtration rates using the Modification of Diet in Renal Disease equation. All 4 men with increased creatinine had moderately lowered glomerular filtration rates (stage III of chronic kidney disease), as did the 3 women with increased creatinine levels. One participant had a severely low-

**TABLE 1. Prevalence of increased creatinine, urate, and CRP levels in participant groups according to gender.**

| Variable / Gender                   | Women         | Men          |
|-------------------------------------|---------------|--------------|
| Increased creatinine values         | 4/58 (6.9%)   | 4/19 (21.1%) |
| Increased urate values              | 10/58 (17.2%) | 6/19 (31.6%) |
| Increased C-reactive protein values | 7/55 (12.7%)  | 1/18 (5.6%)  |

Učestalost povišenih vrijednosti kreatinina, urata i CRP-a u skupinama ispitanika prema spolu prikazuje **tablica 1**. Svim sudionicima s povišenim vrijednostima kreatinina dodatno je izračunana procijenjena brzina glomerularne filtracije primjenjujući MDRD jednadžbu (engl. *Modification of Diet in Renal Disease*). Sva 4 muškarca s povišenim kreatininom imala su umjereno sniženu glomerularnu filtraciju (3. stupanj kronične bubrežne bolesti), kao i 3 žene s povišenim vrijednostima kreatinina. Jedna je sudionica imala teško sniženu glomerularnu filtraciju (4. stupanj kronične bubrežne bolesti). Vrijednost kalija nije bila povišena ni u jednog sudionika.

Dodatno smo analizirali prisutnost čimbenika kardiovaskularnog rizika u 30 sudionika akcije koji su već otprije znali za istodobnu prisutnost AH-a i dislipidemije (25/58; 43,1 % žena i 5/19; 26,3 % muškaraca), što prikazuje **tablica 2**. Čak tih 80 % sudionika imalo je prekomjernu tjelesnu težinu ili bilo pretilo, a njih 76,7 % imalo je povišen opseg struka. Povišena vrijednost urata registrirana je u 23,3 %, povišena vrijednost CRP-a kod 16,7 %, povišena vrijednost glukoze u krvi kod 10 % te povišena vrijednosti kreatinina u 10 % sudionika.

## Rasprava

Bolesti srca i krvnih žila karakterizira izostanak specifičnih simptoma sve dok ne nastupi manifestno oštećenje. Dugoročni ishod ove skupine bolesti determinira prisutnost čimbenika kardiovaskularnog rizika od kojih su, uz one nepromjenjive, najvažniji oni promjenjivi. Podatci o visokoj učestalosti čimbenika kardiovaskularnog rizika koji su registrirani u 308, odnosno procjene kardiovaskularnog rizika u 77 sudionika obiju javnozdravstvenih akcija zabrinjavaju su. Ovakvi rezultati dodatno objašnjavaju i visoki kardiovaskularni pobol i smrtnost u Republici Hrvatskoj te upućuju na potrebu češćih ciljanih javnozdravstvenih akcija u pacijenata koji imaju povišen ITM, dislipidemiju i/ili AH.

Usprkos napretku u liječenju, AH je i dalje najčešća bolest srca i krvnih žila i važan čimbenik rizika koji pridonosi mnogim komplikacijama. Zahtijeva optimalno liječenje, i farmakološkim, i nefarmakološkim pristupom. Dislipidemija je, kao i netom spomenuta AH, važan čimbenik rizika već sama za sebe. U liječenju dislipidemije težimo prema što nižim vrijednostima ukupnog kolesterola, LDL kolesterola i triglicerida u serumu da bi rizik od KVB-a bio što niži. Pretilost za pojedinca znači viši rizik od KVB-a u usporedbi s osobom s normalnim ITM-om i najčešća je poslje-

**TABLE 2. Risk factors in participants with previously diagnosed arterial hypertension and dyslipidemia.**

| At-risk participants with previously diagnosed arterial hypertension and dyslipidemia | Women (n = 25) | Men (n = 5) |
|---|----------------|-------------|
| Increased waist size  | 20             | 3           |
| BMI 25.0-29.9   | 15             | 4           |
| BMI ≥30.0   | 5              | 0           |
| Elevated urate levels   | 6              | 1           |
| Elevated CRP  | 5              | 0           |
| Elevated glucose  | 2              | 1           |
| Elevated creatinine   | 2              | 1           |

\*BMI: Body-mass index; CRP: C-reactive protein.

ered glomerular filtration rate (stage IV of chronic kidney disease). Potassium values were not elevated in any participants.

We performed an additional assessment of cardiovascular risk in 30 participants that had already been previously diagnosed with both AH and dyslipidemia (25/58; 43.1% women and 5/19; 26.3% men), shown in **Table 2**. As many as 80% of these participants were overweight or obese, and 76.7% had increased waist size. Increased urate values were found in 23.3%, increased CRP in 16.7%, increased blood glucose in 10.0%, and increased creatinine values in 10.0% of these participants.

## Discussion

Cardiovascular diseases are characterized by a lack of specific symptoms until manifest damage occurs. Long-term outcomes in this disease group are determined by the presence of cardiovascular risk factors, of which the modifiable ones are the most important. Data on the high prevalence of cardiovascular risk factors found in the 308 participants of the first, and the more detailed assessments on the 77 participants of the second public-health action are cause for concern. These results further clarify the causes of high cardiovascular morbidity and mortality in the Republic of Croatia and indicate a need for more targeted public-health initiatives in patients with elevated BMI, dyslipidemia, or AH.

Despite advances in treatment, AH is still the most common CVD and an important risk factor that contributes to many complications. It requires optimal treatment with both a pharmacological and non-pharmacological approach. Dyslipidemia is, like AH, a significant risk factor on its own. When treating dyslipidemia, the aim is to lower blood cholesterol, LDL-cholesterol, and triglyceride as much as possible to achieve the best reduction in CVD risk. For an individual, obesity represents a higher risk of CVD in comparison with a person with normal BMI and is the most common consequence of insufficient physical activity. Obesity is not "just" being overweight, representing rather a whole spectrum of cardiometabolic diseases and risks related to obesity.<sup>4-7</sup> Obesity

dica nedostatne tjelesne aktivnosti. To nije „samo“ prekomjerna tjelesna težina, riječ je o paleti kardiometaboličkih bolesti i rizika koji su povezani s pretilošću.<sup>4-7</sup> Pretilost je jedan od glavnih čimbenika rizika za KVB te je uz AH, dospjela u epicentar ovog rada. Način je nastajanja kardiovaskularnog rizika glede pretilosti višestruk. Povišen se ITM povezuje s promjenom metabolizma miocita, aterosklerotskim plakom, rigidnošću arterijskog krvožilja, AH, bolestima bubrega, zatajivanjem srca, dislipidemijom, inzulinskom rezistencijom itd.<sup>8-11</sup> Uvidom u tablice korelacija između ITM-a, dislipidemije i AH-a, razvidno je da povišeni ITM uvjetuje i istodobnu dislipidemiju i/ili AH, međutim nepostojanje istih u danom trenutku ne znači da se neće uskoro razviti i eventualno dovesti do jedne ili više manifestnih KVB-a.

Dobiveni rezultati javnozdravstvene akcije u povodom Svjetskog dana srca 2015. godine u gradu Zagrebu upućuju na visoku prisutnost nereguliranih čimbenika rizika u 308 sudionika akcije, koji su najčešće bili u dobi između 60 i 79 godina. U skupini onih koji bez prethodne pripreme sudjelovali u javnozdravstvenoj akciji na Trgu Petra Preradovića i mogli samostalno izabrati koje čimbenike rizika žele kontrolirati, od tradicionalnih promjenjivih čimbenika rizika istaknuli su se povišen AT (92,5 % sudionika) i povišen ITM (46,5 % ima prekomjernu tjelesnu težinu, a 25,7 % je pretilo). Izrazito visoka vrijednost ukupnog kolesterola registrirana je u 11,8 %, a izrazito visoka vrijednost glukoze u kapilarnoj krvi u 4,1 % sudionika akcije. S obzirom na navedeno, najrizičnijim su pojedincima uručene pozivnice za dodatan probir i procjenu kardiovaskularnog rizika.

Od 77 ispitanika koji su se i odazvali na pozivnicu, utvrdili smo visoku zastupljenost čimbenika rizika koja potvrđuje optimalno postavljene vrijednosti za procjenu kardiovaskularnog rizika izvan ordinacije obiteljske medicine i sustava redovite zdravstvene zaštite. Povišene vrijednosti AT-a imalo je 90,9 %, dislipidemiju 85,7 %, a povećan opseg struka registriran je u 84,4 % sudionika. Više od tri četvrtine (78,9 %) sudionika akcije je imalo prekomjernu tjelesnu težinu ili je bilo pretilo, što je podatak kao i u prošlogodišnjoj akciji koja je uključila sudionike mlađih dobnih skupina.<sup>12</sup>

Glede svjesnosti o važnosti promjenjivih čimbenika kardiovaskularnog rizika, dodatno smo analizirali skupinu ispitanika s poznatom i AH i dislipidemijom. Utvrdili smo da je u tih ispitanika najzastupljeniji čimbenik rizika povišen ITM, dakle prekomjerna tjelesna težina koja je povezana i s povišenim opsegom struka, ali i s učestalosti i kontrolom AH-a i dislipidemije. Utvrdili smo da se osobe s poznatim čimbenicima rizika baš i ne pridržavaju mjera zdravog životnog stila i liječenja, kako ni glede dostizanja ciljnih vrijednosti čimbenika rizika, tako ni u prevenciji komplikacija.

Vrijednosti CRP-a, kao poznate i istraživane varijable u kontekstu ateroskleroze i KBS-a te kreatinin sa svojom komponentom „ubrzane ateroskleroze“ u renalnoj insuficijenciji, ali i vrijednosti urata, imaju svoju ulogu u određivanju kardiovaskularnog rizika.<sup>13-20</sup> Međutim, za interpretaciju značenja vrijednosti CRP-a, kreatinina i urata u pojedinca, u svrhu određivanja detaljnijeg KV rizika, ipak je potrebno stručno mišljenje. Jedna slučajno određena vrijednost CRP-a i/ili kreatinina i/ili urata, sama za sebe ipak govori manje nego u slučaju kada su nam na raspolaganju i dodatni anamnestički podatci koje pak možemo dobiti na liječničkom pregledu.

Kao rezultat ovog istraživanja može se smatrati saznanje kako je za probir u svrhu detekcije pojedinaca s ne samo prisutnim već

is one of the main CVD risk factors and has, along with AH, become the focus of this article. Obesity leads to cardiovascular risk in several ways. Increased BMI is associated with changes in myocyte metabolism, atherosclerotic plaque, arterial rigidity, AH, kidney disease, heart failure, dyslipidemia, insulin resistance, etc.<sup>8-11</sup> The correlation tables between BMI, dyslipidemia, and AH clearly show that increased BMI coexists with dyslipidemia and/or AH, but the absence of these is no guarantee that they will not develop within a short period of time and eventually lead to one or more manifested CVD.

The data gathered as part of the public-health initiative on World Heart Day in 2015 in the city of Zagreb indicate a high prevalence of unregulated risk factors in 308 participants, mostly between 60 and 79 years of age. In the first group of participants, who had no preparation before taking part in the action on the Petar Preradović Square and could select which risk factors they wanted to check, among traditional modifiable risk factors most common were elevated BP (92.5% of the participants) and increased BMI (46.5% was overweight, 25.7% was obese). Significantly elevated total cholesterol values were found in 11.8% of the participants, and very high glucose levels in capillary blood in 4.1%. Special invitations were given to the above participants to attend an additional screening and cardiovascular risk assessment process.

In the 77 participants who responded to the invitation, we found a high prevalence of risk factors, which confirms optimally set values for cardiovascular risk assessment outside of family medicine practice and the regular health care system. Elevated BP values were found in 90.9%, dyslipidemia in 85.7%, and increased waist size in 84.4% of the participants. More than three quarters (78.9%) were overweight or obese, which is similar to last-year's results which included participants from younger age groups<sup>12</sup>.

Regarding awareness of the significance of changeable cardiovascular risk factors, we performed an additional analysis on participants with previously-diagnosed AH and dyslipidemia. We found that increased BMI was the most prevalent risk factor in this group of participants and was associated with increased waist size as well as incidence of AH and dyslipidemia. We found that persons with known risk factors adhere to treatment and healthy lifestyle measures only poorly, both in reaching target risk factor levels and in preventing complications.

CRP values are a well-studied variable in the context of atherosclerosis and CHD. Urate values and creatinine, with its “accelerated atherosclerosis” in renal insufficiency, both have a role in determining cardiovascular risk<sup>13-20</sup>. However, to properly interpret the significance of CRP, creatinine, and urate values in an individual when assessing cardiovascular risk, an expert opinion is still required. A single accidentally determined CRP and/or creatinine and/or urate value alone tells us much less when there is no medical history data available from a proper medical exam.

As a result of our research, we can conclude that in order to screen the general population for increased traditional modifiable risk factors at a public-health gathering (action), it is enough to determine BMI and measure waist size and BP values. However, more detailed insight into the presence of

i povišenim vrijednostima tradicionalnih promjenjivih čimbenika rizika, unutar opće populacije na javnozdravstvenom okupljanju (akciji), dostatno utvrditi ITM i izmjeriti vrijednosti opsega struka i AT-a. Međutim, za detaljniji uvid u prisutnost čimbenika rizika ipak je potrebno „klasično“ određivanje serumskih vrijednosti lipida i glikemije natašte prema standardnom postupniku u biokemijskom laboratoriju. Glede „novijih“ čimbenika rizika i/ili indirektnih pretkazatelja kardiovaskularnog rizika i pobola, kao što su CRP, kreatinin i urati, za interpretaciju dobivenih vrijednosti tih varijabli potreban je i liječnički pregled, kada postoji mogućnost dopune 12-kanalnim elektrokardiogramom. Svemu navedenom u prilog ide i opservacija nizozemskih stručnjaka koji su slično utvrdili na razini primarne zdravstvene zaštite, u smislu da je detekcija pojedinih čimbenika rizika važna za sve, međutim, opsežniji pristup sa stručnim mišljenjem rezerviran je samo za one s umjerenim ili povišenim kardiovaskularnim rizikom<sup>21</sup>. Također valja istaknuti da probir samo jednog čimbenika rizika može dodatno opteretiti zdravstveni sustav i uznemiriti, bolesnika prije svega zbog mogućnosti lažno pozitivnog nalaza.

Pozitivan je podatak da od ukupno 77 osoba koje su se odazvale ciljanoj javnozdravstvenoj akciji samo su dva pušača, što tumačimo prosječnom životnom dobi koja je viša nego u prethodnim akcijama.

Prikupljanje podataka o statusu zastupljenosti i veličini alteracije pojedinih čimbenika rizika ima ulogu u predviđanju mogućih manifestacija KVB u određenoj populaciji. Na temelju navedenog, zbog visoke učestalosti čimbenika rizika i pojavnosti skupine KVB pitanje koje se nameće samo po sebi jest: *Quo vadis*, prevencija kardiovaskularnih bolesti? Adekvatan odgovor koji proizlazi iz rezultata ovog istraživanja bio bi u jedan ili više klinički manifestnih ili asimptomatskih entiteta iz palete KVB-a. Prema epidemiološkim podatcima iz Registra akutnoga koronarnog sindroma Grada Zagreba prva manifestacija KBS-a jest akutni infarkt miokarda od kojih polovica bolesnika premine prije dolaska u bolničku ustanovu. Inozemni su autori u prošlom stoljeću notirali da je prva prezentacija KBS-a neprepoznati infarkt miokarda, podjednako i u muškaraca i u žena. Novije publikacije kao prve manifestacije KVB-a navode u muškaraca infarkt miokarda, iznenadnu srčanu smrt i aneurizme abdominalne aorte, dok u žena prva mjesta drže cerebrovaskularna zbivanja koje slijedi klinički entitet zatajivanje srca. Stabilna je angina u manjem broju, ali podjednako zastupljena u muškaraca i žena<sup>22-25</sup>.

Svjesni smo i ograničenja ovog istraživanja, prije svega zbog načina izbora sudionika koji je, zasigurno, utjecao na rezultate. Kako je bila riječ o organiziranoj javnozdravstvenoj akciji koja je bila otvorenog tipa, postojala je mogućnost dolaska osoba svih dobnih skupina koje su još pritom mogle samostalno izabrati koji čimbenik rizika žele kontrolirati. Nadalje, dobiveni rezultat razine jednog ili više čimbenika rizika u 308 sudinika pojedinih nisu morali smatrati značajnim ili su već otprije bili svjesni detektiranog problema, što bi moglo i objasniti odziv od 77 % na pozivnicu za procjenu kardiovaskularnog rizika.

## Zaključak

Potvrdili smo otprije poznatu „boljku“ opće populacije u Gradu Zagrebu, u obliku povećanog indeksa tjelesne mase i arterijske hipertenzije. Uočili smo blag pristup otprije poznatim bo-

risk factors still requires “classic” laboratory tests for fasting serum lipid and glucose values according to standard procedures. Regarding “newer” risk factors and/or indirect indicators of cardiovascular risk and morbidity in the form of CRP, creatinine, and urates, the interpretation of these values requires a medical examination that can include further tests with a 12-lead electrocardiogram. The above is supported by a Dutch study that found similar results at the primary health-care level in the sense that detecting individual risk factors was important for everyone, but a more exhaustive approach that includes an expert opinion should be available for those with moderate or increased cardiovascular risk<sup>21</sup>. It should also be noted that screening for just a single risk factor can burden the healthcare system and cause undue fear in the patient due to the possibility of false-positive results.

A positive aspect of our data is that there were only two smokers among the 77 persons that responded to the invitation for targeted assessment, which we hypothesize is due to the higher average age of the participants in comparison with past initiatives.

Gathering data on the prevalence and alterations in individual risk factors plays a role in predicting possible manifestations of CVD in a given population. Thus, due to a high incidence of risk factors and presence of CVD, the question that presents itself is: Cardiovascular disease prevention, *quo vadis*? An adequate reply based on the results of this study would be – to one or more clinically manifesting or asymptomatic entities in the CVD spectrum. According to epidemiological data from the City of Zagreb Register of Acute Coronary Syndrome, the first manifestation of CHD is acute myocardial infarction, and, despite more successful hospital treatment, half of these patients die before reaching the hospital. In the 20<sup>th</sup> century, authors noted that the first presentation of CHD is myocardial infarction, roughly equally in women and in men. Newer publications list myocardial infarction, sudden cardiac death, and abdominal aortic aneurysm as the first manifestations of CVD in men, whereas in women the first place is held by cerebrovascular events followed by heart failure as a clinical entity. Stable angina is less common, but equally prevalent in men and women<sup>22-25</sup>.

We are also aware of the limitations of our study, primarily in that the way participants were selected undoubtedly influenced the results. Since this was an organized public-health initiative of the open type, persons from all age groups could participate as well as choose which risk factor they wanted to be tested for. Furthermore, finding one or more risk factors in 308 participants could mean that the participants did not consider them as important or were already aware of the risk factors; this could also at least partly explain the response rate of 77% to the invitation for detailed cardiovascular risk assessment.

## Conclusion

We confirmed the already established issues of the general population in the city of Zagreb, namely increased body-mass index and AH. We noticed a dismissive approach to those issues in patients previously diagnosed with AH and dyslipi-



lesnicima s AH-om i dislipidemijom, kako glede neliječenja tih bolesti, tako i glede suboptimalnoga medikamentnog liječenja. Uvidjeli smo i blag pristup mjerama korekcije nezdravih životnih navika u osoba s AH-om i dislipidemijom koje imaju povišen ITM i povišen opseg struka.

Dobiveni podatci upućuju na potrebu kontinuiranog i čvršćeg pristupa promjenjivim čimbenicima rizika. Potrebno je daljnje prosvjeđivanje o važnosti pravilne ishrane, redovite tjelevoježbe, štetnosti prekomjerne tjelesne težine, ali i potrebi redovitog uzimanja preporučene terapije i inzistiranju na postizanju ciljnih vrijednosti i AT-a i lipidograma.

Poželjno je slične javnozdravstvene akcije ponavljati češće, međutim, u konačnici je ipak u odabраних potrebno stručno mišljenje tima iskusnih zdravstvenih djelatnika i kontinuitet rad na području prevencije kardiovaskularnih bolesti.

demia, both in the sense of a failure to treat these diseases and in suboptimal drug treatment. A dismissive approach was also evident in the approach to corrective measures for unhealthy lifestyle habits in persons with AH and dyslipidemia who had increased BMI and waist size.

The data indicate a need for a continuous and firmer approach to modifiable risk factors. Further education of the public is required on the importance of healthy diet, regular exercise, the deleterious effect of excess body weight, and also on the need for adherence to recommended treatment and achieving target AP and lipid values.

Public-health initiatives such as this should be more common; however, at-risk participants still require the expert opinions of a team of experienced health professionals and continuous work on the prevention of cardiovascular diseases.

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