

Učestalost čimbenika kardiovaskularnog rizika u sudionika javnozdravstvene akcije povodom Svjetskog dana srca 2014. u Zagrebu

Prevalence of Cardiovascular Risk Factors in the Participants of the Public Health Initiative on the Occasion of the 2014 World Heart Day in Zagreb

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SAŽETAK: U sklopu javnozdravstvene akcije koju je u povodu Svjetskog dana srca 2014. godine organizirala Zaklada Hrvatska kuća srca i Grad Zagreb – Gradski ured za zdravstvo u Poliklinici za prevenciju kardiovaskularnih bolesti i rehabilitaciju u Zagrebu osigurani su preventivni kardiovaskularni pregledi za osobe u dobnoj skupini od 40 do 60 godina, koje do sada nisu bile pregledane s kardiološkog aspekta. Cilj je bio uvidjeti tradicionalne čimbenike rizika za kardiovaskularne bolesti (KVB) u spomenutoj skupini i izvijestiti o rezultatima provedene javnozdravstvene akcije. U svih su ispitanika učinjena antropometrijska mjerenja (tjelesna težina, visina, indeks tjelesne mase), određene su vrijednosti serumskih lipida i glukoze natašte te je snimljen 12-kanalni EKG i izmjeren arterijski tlak. Nakon toga su ih pregledali ili internist ili kardiolog. Rezultati su poražavajući, s obzirom na povišen indeks tjelesne mase (ITM) u 3/4 sudionika, prisutnost arterijske hipertenzije (AH) u oko 45% i hiperlipidemije u 55% sudionika. Također, registrirana je češća prisutnost slabije regulirane AH u muškaraca, a u žena se češće bilježi povišen ITM. Dobiveni rezultati naglašavaju i impliciraju potrebu za češćim javnozdravstvenim akcijama.

SUMMARY: As part of a public health initiative on the occasion of the 2014 World Heart Day, the Croatian Heart House and the City of Zagreb – the City Health Center at the Institute for Cardiovascular Prevention and Rehabilitation in Zagreb – organized preventive cardiovascular examinations for the persons between the ages of 40 and 60 that had not had a cardiac examination before. The goal of this initiative was to detect the traditional risk factors for cardiovascular diseases in the aforementioned group and to report the results of the conducted public initiative. Anthropometric measurements were conducted on all subjects (body weight, height, body mass index), fasting values of serum lipids and glucose were determined, 12-lead ECG was performed, and blood pressure pressure was measured. Following this, the participants were examined by either an internist or a cardiologist. The results were devastating: increased body mass index (BMI) was noted in 2/3 of the patients, as well as the presence of arterial hypertension (AH) in 45%, and hyperlipidemia in 55% patients. Men showed higher prevalence of unregulated AH, and women showed increased BMI. These results emphasize the problem and demonstrate the need for more frequent public health initiatives.

KLJUČNE RIJEČI: čimbenici rizika, Svjetski dan srca, Hrvatska.

KEYWORDS: risk factors, World Heart Day, Croatia.

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Uvod

Svjetski dan srca se obilježava od 2000. godine, u pravilu zadnju nedjelju mjeseca rujna, s ciljem informiranja populacije o vodećem uzroku smrti u svijetu, koji godišnje odnosi 17,3 milijuna ži-

Introduction

World Heart Day has been celebrated since 2000 on the last Sunday in September. The goal of this initiative is to inform the population about the leading cause of death in the world,

vota. U Poliklinici za prevenciju kardiovaskularnih bolesti i rehabilitaciju u Zagrebu se obilježava od 2000. godine. Svake godine vodeća tema koja odražava ključnu tematiku glede zdravlja srca je drugačija. U 2014. godini tema je bila stvaranje okoline povoljne za srčano zdravlje, u vidu prevencije kardiovaskularnih bolesti (KVB) modifikacijom načina života te liječenja i postojećih bolesti i čimbenika rizika za nastanak KVB-a poput arterijske hipertenzije, hiperlipidemije, šećerne bolesti, pušenja i dr. Svjetska kardiološka federacija smatra da bi se 80% preranih smrti od KVB-a moglo izbjeći ukoliko se modificiraju i kontroliraju četiri vodeća čimbenika rizika – pušenje, nezdrava prehrana, fizička neaktivnost i povećan unos alkohola. Uspjeh Svjetskog dana srca ovisi o angažmanu organizacija u obilježavanju istog, a u vidu podizanja svjesnosti o KVB-u, vodećem uzorku mortaliteta u svijetu.

Skupina KVB predstavlja vodeće bolesti razvijenog svijeta. Taj se trend sporo, ipak smanjuje, zahvaljujući javnozdravstvenim akcijama i prosvijećenosti stanovništva o opasnostima tih bolesti, koje su zapravo najčešće asimptomatske do časa dok ne nastupi manifestno oštećenje.

U Hrvatskoj svaka druga osoba umire od jedne od KVB, čime smo pozicionirani u drugoj polovini, ako ne i četvrtoj četvrtini u skupini zemalja članica EU. Istodobno, po tom smo pitanju bolji, u usporedbi sa zemljama koje nisu članice EU. Dobra je vijest ta što se stopa mortaliteta od KVB u RH, polako, ali ipak brojčano zamjetno, smanjuje, svo vrijeme držeći svoju vodeću poziciju.¹⁻³

U sklopu javnozdravstvene akcije koju je u povodu Svjetskog dana srca 2014. godine organizirala Zaklada Hrvatska kuća srca i Grad Zagreb – Gradski ured za zdravstvo osigurani su preventivni kardiovaskularni pregledi za osobe u dobnoj skupini 40 do 60 godina koje do sada nisu bile pregledane s kardiološkog aspekta. Ove smo se godine fokusirali na promjenjive čimbenike rizika: indeks tjelesne mase (ITM), arterijsku hipertenziju, dislipidemije i šećernu bolest.⁴ Za ta smo se četiri čimbenika rizika odlučili zbog mogućeg ranog nefarmakološkog pristupa, u vidu promjene načina života. Svi navedeni čimbenici rizika, u kombinacijama ili zasebno, opasnost su za zdravlje pojedinca. S obzirom na pojavnost akutnog infarkta miokarda u osoba u dobi od 40 do 60 godina, odlučili smo provesti javnozdravstvenu akciju baš u toj dobi. Željeli smo uvidjeti koji je najzastupljeniji čimbenik rizika i tako detektirati na što trebamo djelovati.

Arterijska hipertenzija (AH) je najznačajniji čimbenik rizika koji doprinosi, mnogim KVB i stanjima povezanim s njima, a također i cerebrovaskularnim bolestima te bolestima bubrega. Hiperlipidemija (HLP) je vrlo često udružena s drugim čimbenicima, a kardiovaskularni rizik kojeg donosi je visok, čak i ako drugi čimbenici nisu izraženi. Liječenje HLP je danas ubikvitarno. Govoreći o liječenju HLP, nije pitanje da li da budemo agresivniji, već ka koliko niskim vrijednostima lipida da stremimo. Pretilost za pojedinca predstavlja viši rizik od KVB-a nego za onog njemu sličnom, ali s normalnim ITM-om. To nije „samo“ pretilost, riječ je o paleti bolesti i rizika koji se vežu s pretilošću. Relativni rizik od KVB-a je u bolesnika sa šećernom bolešću, u usporedbi s općom populacijom, povećan dva do četiri puta.⁵⁻⁸

which claims 17.3 million lives every year. At the Institute for Cardiovascular Prevention and Rehabilitation in Zagreb, World Heart Day has been celebrated since 2000. Each year, the leading topic changes to reflect a key theme in cardiac health. The topic for 2014 was the creation of an environment beneficial for cardiac health as it pertains to the prevention of cardiovascular diseases (CVD) through lifestyle modifications and treatment of existing diseases and risk factors for CVD such as arterial hypertension, hyperlipidemia, diabetes, smoking, etc. The World Heart Federation believes that 80% of untimely deaths due to CVD could be avoided if the four leading risk factors are modified and controlled – smoking, unhealthy diet, lack of physical activity, and increased alcohol consumption. The success of the World Heart Day depends on the engagement of the participating organizations, with the goal of increasing the awareness of CVD, the leading cause of death in the world.

The CVD group represents the leading diseases of the Western world. That trend has been slowly but steadily reduced owing to the public health initiatives and the awareness of the population about the dangers of those diseases, which are in most cases asymptomatic until the moment of manifested damage.

In Croatia, one in two people die of CVD. This places us in the bottom half, if not the bottom quarter of EU member countries regarding this statistic. At the same time, Croatia is doing better regarding CVD compared with non-member states. The good news is that CVD mortality rate in Croatia is slowly but noticeably decreasing, while still retaining the leading position.¹⁻³

As a part of a public health initiative on the occasion of 2014 World Heart Day, the Croatian Heart House and the City of Zagreb – the City Health Center at the Institute for Cardiovascular Prevention and Rehabilitation in Zagreb – organized preventive cardiovascular examinations for the persons between the ages of 40 and 60 that had not had a cardiac examination before. This year we focused on the variable risk factors: body mass index (BMI), arterial hypertension, dyslipidemia, and diabetes.⁴ These four risk factors were chosen due to the possible early non-pharmacological approach in the form of lifestyle changes. All of those factors, combined or occurring individually, pose a health risk. Having in mind the prevalence of acute myocardial infarction in the age group between 40 and 60, we chose to conduct the public health action in that age group. We wanted to identify the most common risk factors and through this determine the next course of our action.

Arterial hypertension (AH) is the most important risk factor which not only contributes to many CVDs and related conditions, but to cerebrovascular diseases and renal diseases. Hyperlipidemia (HLP) often occurs together with other risk factors, and the cardiovascular risk it brings is high even if other risks factors are not pronounced. Treatment of HLP today is ubiquitous. When considering the treatment of HLP, the question is not how aggressive to be, but what are the lowest lipid values we are striving towards. Patient obesity represents a higher CVD risk factor than those similar to them, but with a normal BMI. This does not refer “just” to obesity but to a whole range of related diseases and risks. The relative CVD risk factor is higher for patients with diabetes as compared to the general population by a factor of 2 or 4.⁵⁻⁸

Bolesnici i metode

Metodologija rada je već opisana u objavljenom priopćenju s 10. kongresa Hrvatskog kardiološkog društva.⁴ Ukratko, sudionici su se unaprijed naručivali telefonski nakon što je to objavljeno u tiskanim i elektroničkim medijima u gradu Zagrebu. Pozive je primala prvostupnica sestrinstva koja je upisivala ispitanike u dobi od 40 do 60 godina koji do tada nisu nikada bili pregledani kardiološki. Svim ispitanicima skrenuta je pažnja na potrebu dolaska natašte u jutarnjim satima. Po dolasku u ustanovu učinjeno je mjerenje tjelesne težine, visine te je određen ITM. Iz uzoraka venske krvi su određeni vrijednosti lipida i glukoza natašte. Snimljen je 12-kanalni EKG i izmjeren arterijski tlak. Po prispjeću nalaza pregledali su ih kardiolog ili internist koji su procijenili kardiovaskularni rizik i dali upute za potrebno nefarmakološko i farmakološko liječenje te eventualnu daljnju obradu.

Rezultati

Ukupno je pregledan 91 sudionik akcije, od čega su dvije trećine bile žene (64% žene 58/91; 36% muškarci 33/91). Većina (93%, 85/91; 58%, Ž 53/91; 35%, M 32/91) ispitanika je bila u dobnoj skupini od 40 do 65 godina, 6% sudionika starije od 65 godina, a jedan sudionik je bio mlađi od 40 godina.

Dislipidemija je registrirana u 55% sudionika (50/91; 32/91 kombinirana, 18/91 *single lipid*), od kojih je 14% znalo za dislipidemiju od ranije.

Povišene vrijednosti arterijskog tlaka (**slika 1**) su registrirane u 45% (42/91, Ž 23, M 18) sudionika akcije, od kojih je već polovica imala dijagnosticiranu arterijsku hipertenziju (21/91, Ž 15, M 6).

Samo četvrtina sudionika (26%) imala je normalnu vrijednost ITM (24/91, Ž 17, M 7). Ukupno 43% ispitanika (39/91; Ž 28, M 11) je imalo prekomjernu tjelesnu težinu, a 31% (28/91, Ž 13, M 15) je bilo pretilo (**slika 2**).

Nešto više od polovice sudionika akcije s normalnim indeksom tjelesne mase (58%, 14/24; Ž 11, M 3) imali su normalne vrijednosti arterijskog tlaka i nisu bili hipertoničari (**slika 3**), slično sudionicima (**slika 4**) koji su imali vrijednost ITM-a višu od 25 (57%, 38/67; Ž 26, M 12). Većina sudionika akcije s normalnim ITM-om (7/10, 70%), koja je imala od prije poznatu AH, imala je povišene vrijednosti arterijskog tlaka (**slika 3**). Kod hipertoni-

Patients and Methods

Our methodology has already been described in the published report from the 10th Congress of Croatian Cardiac Society.⁴ In short, the participants registered in advance by telephone after having been notified of the initiative in local printed and electronic media in Zagreb. The calls were answered by a nurse who noted all the participants age 40 to 60 who had not by that time had a cardiac examination. All of the participants were reminded of the importance of early morning arrival and fasting. Upon their arrival at the institution, measurements were made of their weight and height, and BMI was calculated. The fasting values of lipids and glucose were measured on a sample of their venous blood. The 12-lead ECG and blood pressure have been done. A cardiologist or an internist went over these results and the cardiovascular risk was estimated. Finally, they were given further instructions for necessary non-pharmacological and pharmacological treatment and possible further treatment.

Results

A total of 91 participants were examined, out of which two thirds were women (64% women 58/91; 36% men 33/91). The majority (93%, 85/91; 58%, women 53/91; 35%, men 32/91) of the participants were in the age group 40-65, 6% of the participants were older than 65, and 1 participant was younger than 40.

Dyslipidemia was registered in 55% of the participants (50/91; 32/91 combined, 18/91 "single lipid"), 14% of whom were already aware of dyslipidemia.

Increased values of blood pressure (**Figure 1**) were registered in 45% (42/91, women 23, men 18) of the participants, one half of whom had been diagnosed with arterial hypertension (21/91, women 15, men 6).

Only one quarter of the participants (26%) had a normal BMI value (24/91, women 17, men 7). A total of 43% participants (39/91, women 28, men 11) were overweight, and 31% (28/91, women 13, men 15) were obese (**Figure 2**).

Slightly more than one half of the participants with a normal body mass index (58%, 14/24; women 11, men 3) had normal values of arterial pressure and were not hypertonic (**Figure 3**), similar to the participants (**Figure 4**) who had BMI over 25 (57%, 38/67; women 26, men 12). A majority of the participants with

FIGURE 1. Values of blood pressure in the participants of the public health initiative.

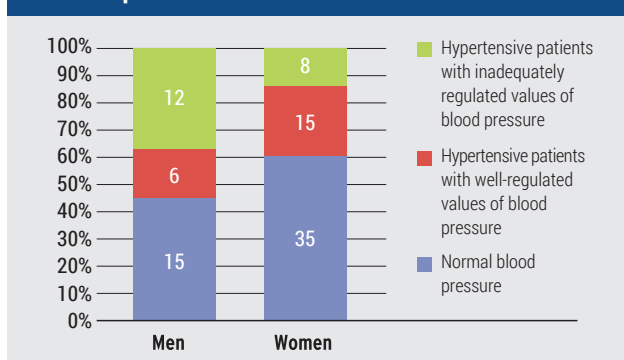


FIGURE 2. Body mass index of participants by gender.

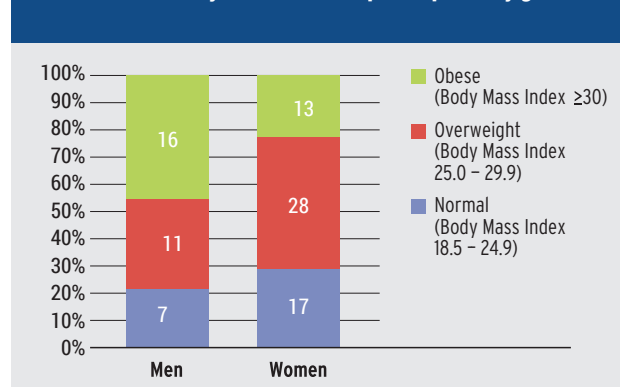
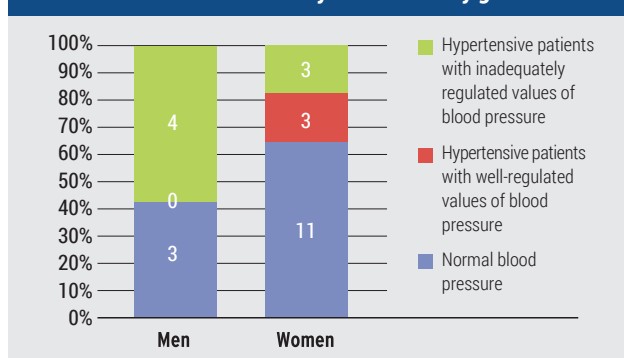


FIGURE 3. Values of blood pressure in the participants of the initiative with a body mass index by gender.

čara s povišenim ITM (**slika 4**) neadekvatno regulirane vrijednosti arterijskog tlaka bile su još češće (24/31; 77%).

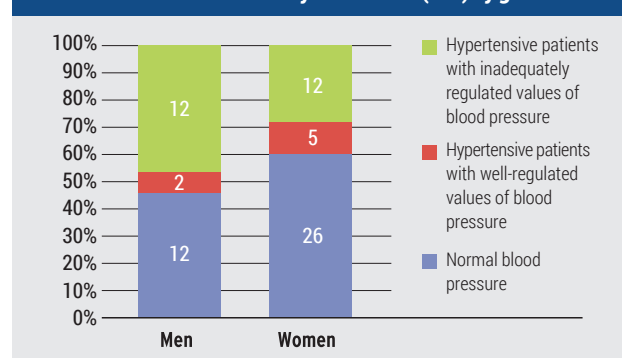
Povišena vrijednost GUK-a bila je registrirana u 2% ispitanika (2 osobe), koji su od prije imali dijagnosticiranu intoleranciju glukoze.

Uvidom u EKG sudionika akcije, 90 ih je bilo u sinusnom ritmu, samo jedan je imao fibrilaciju atrijsku, i to novootkrivenu, nepoznatog trajanja. U skupini bolesnika s AH zabilježili smo dva opisa hipertrofije lijeve klijetke, jedan prednji lijevi hemiblok, jednu fibrilaciju atrijsku i jednu supraventrikularnu ekstrasistoliju. U skupini bolesnika bez AH, za istaknuti je samo jedna supraventrikularna ekstrasistolija i jedan bolesnik s opisom prednjeg hemibloka i smetnji provođenja desnom granom.

Rasprava i zaključak

Dobiveni rezultati javnozdravstvene akcije ukazuju na visoku prisutnost čimbenika rizika u sudionika javnozdravstvene akcije povodom Svjetskog dana srca 2014. u Zagrebu. Tri četvrtine sudionika akcije je imalo prekomjernu tjelesnu težinu ili je bilo pretilo, a polovica ima povišene vrijednosti arterijskog tlaka i dislipidemiju. S obzirom na rezultate, postavlja se pitanje detekcije AH u muškaraca i povišenog indeksa tjelesne mase u žena. Zajednički je nazivnik raširena svijest o štetnosti navedenih čimbenika rizika, ali i veći angažman liječnika obiteljske medicine koji su ipak na prvoj liniji. Isto vrijedi i za poražavajuće brojeve koji govore o slabo reguliranoj AH.

S obzirom na prevalenciju povišenog ITM-a, rezultati su poražavajući. Sukladno dostupnim podacima, povišen ITM ima više od pola stanovnika sjeverne Amerike i Europe, a u Hrvatskoj oko četvrtina populacije⁹. Pretilost je jedan od glavnih čimbenika rizika za KVB te je nažalost dospjela u epicentar ove publikacije. Način nastajanja KV rizika je po pitanju pretilosti višestruk. Povišen ITM se povezuje s promjenom metabolizma miocita, aterosklerotskim plakom, povećanju rigidnosti arterijskog krvožilja, AH, bolestima bubrega, zatajivanjem srca, hiperlipidemijom, inzulinskom rezistencijom, itd. Noviji entitet *obesity paradox* ne smije biti prepreka agresivnijem pristupu ovom proširenom javnozdravstvenom problemu. Promjena načina života, koja bi trebala uključivati i fizičku aktivnost, put je ka smanjenju prevalencije pretilosti. Vrijednost ITM-a <25 kg/m² se dovodi u vezu s višestrukim povoljnim učincima na zdravlje pojedinca^{5,10-13}. Fizička neaktivnost je sama za sebe čimbenik rizika za KVB i povezana

FIGURE 4. Values of blood pressure in the participants of the action with an increased body mass index (<25) by gender.

normal BMI (7/10, 70%) who were previously diagnosed with AH had increased values of blood pressure (**Figure 3**). Inadequately regulated values of arterial pressure were even more common with hypertensive participants with increased BMI (**Figure 4**).

An increased value of blood glucose was noted with 2% of the participants (two participants) who had previously been diagnosed with glucose intolerance.

ECG of 90 of the participants showed sinus rhythm; only one showed atrial fibrillation which was newly discovered and of unknown duration. In the group of patients with AH we noted two descriptions of left ventricle hypertrophy, one left anterior hemiblock, one atrial fibrillation and one supraventricular extrasystole. In the group of patients without AH, of note were only one supraventricular extrasystole and one patient with a description of anterior hemiblock and flow obstruction of the right bundle.

Discussion and Conclusion

The results of the public health initiative show a high prevalence of risk factors among the participants of initiative conducted on the occasion of World Heart Day 2014 in Zagreb. Three quarters of the participants of the action were overweight or obese, one half had increased values of blood pressure and dyslipidemia. These results raise the question of AH identification in men and increased body mass index in women. The common denominator is widespread awareness of the damaging effect of these risk factors, as well as increased engagement of the general practitioners who still represent the front lines in this fight. The same stands for the discouraging numbers that are proof of weak regulation of AH.

Considering the prevalence of increased BMI, the results are very discouraging. According to the available data, more than half of the population of North America and Europe has an increased BMI, whereas in Croatia the number is around one quarter of the population.⁹ Obesity is one of the main risk factors for CVD and has unfortunately become the focus of this paper. The genesis of CV risk factors related to obesity is varied. Increased BMI is linked to changes in myocyte metabolism, atherosclerosis plaque, increased rigidity of the arterial vessels, AH, renal disease, heart failure, hyperlipidemia, insulin resistance, etc. The recent "obesity paradox" must not be an obstacle for a more aggressive approach to this widespread public health problem. Lifestyle changes which should also include physical activity, are a way

je s općenito višom stopom mortaliteta. Redovita tjelovježba doprinosi manjoj incidenciji KVB, mortalitetu od istih, a povoljno utječe i na ishode u bolesnika s utvrđenom koronarnom bolesti srca (KBS). Unatoč jasnim povoljnim učincima redukcije tjelesne težine i redovite fizičke aktivnosti, broj ljudi koji prakticira takav način života je zapravo ipak (još uvijek) malen¹⁴.

Hiperlipidemija je čest i bitan čimbenik rizika za KBS, ali i za druge oblike periferne ateroskleroze, u vidu zahvaćenosti karotidnih arterija, perifernog arterijskog krvožilja, šećerne bolesti, itd. U kontekstu primarne prevencije vrlo je važno procijeniti stupanj rizika. I po pitanju hiperlipidemije, sa ili bez hipolipemika, važno je ohrabriti bolesnika u postizanju i održavanju adekvatne tjelesne težine^{7,15}.

Sukladno dostupnim podacima, 45% stanovnika Hrvatske ima arterijsku hipertenziju. Ova bolest je također velik i bitan čimbenik rizika za razvoj KVB koji direktno doprinosi KBS, mogućim udaru, zatajivanju srca, oštećenju (i zatajenju) bubrežne funkcije te bolestima perifernog krvožilja. Zahtijeva optimalno liječenje, kako farmakološko, tako i nefarmakološki pristup. Promjene na neurohumoralnoj i endokrinološkoj razini u kontekstu fizičke aktivnosti su pozitivne i povoljne, u vidu nižih (poboljšanih) vrijednosti arterijskog tlaka^{8,16}.

Dobiveni podatci impliciraju i nameću potrebu za agresivnijim i kontinuiranim pristupom promjenjivim čimbenicima rizika za KVB te promjenom načina života. S obzirom na rezultate ove javnozdravstvene akcije, jasna je potreba za češćim sličnim akcijama, kako bismo uvidjeli vodeće čimbenike rizika ovog podneblja i identificirali najzastupljeniji čimbenik rizika te se tako i usmjerili ka onome s kojim se prvim valja uhvatiti u koštac.

towards a decrease of obesity prevalence. BMI value of <25 kg/m² is associated with various beneficial effects for the health of an individual^{5,10-13}. Lack of physical activity in and of itself is a CVD risk factor and is associated with the general increased mortality rate. Regular exercise contributes towards lower incidence of CVD and mortality rate caused by CVD, and also has a beneficial effect on the clinical outcome in patients with diagnosed coronary heart disease (CHD). Despite the clear beneficial effects of the reduction of body weight and regular physical exercise, the number of people practicing this lifestyle is, however, still low.¹⁴

Hyperlipidemia is an important risk factor for CHD and for other forms of peripheral atherosclerosis, in the form of the involvement of the carotid arteries, peripheral arterial vessels, diabetes, etc. In the context of primary prevention it is very important to estimate the degree of risk. In case of hyperlipidemia, with or without hypolipemics, it is very important to encourage the patient in achieving and maintaining the adequate body weight^{7,15}.

According to available data, 45% of the population of Croatia suffers from arterial hypertension. This disease is also a high and important risk factor for the development of CVD which directly contributes to the CHD, stroke, heart failure, damage or failure of renal function, and disease of peripheral blood vessels. It requires optimal treatment and both a pharmacological and non-pharmacological approach. Changes in the neurohumoral and endocrinological level in the context of physical activity are positive and beneficial in view of lower (improved) values of blood pressure.^{8,16}

The data acquired indicate the need to encourage lifestyle changes and a more aggressive and continuous approach towards the variable risk factors for CVD. Considering the results of this public health initiative, it is clear that there is a need for more frequent similar initiatives in order to detect the leading risk factors in Croatia and identify the most common risk factor so as properly prioritize our efforts.

LITERATURE

1. World Heart Day 2014. <http://www.world-heart-federation.org/what-we-do/awareness/world-heart-day-2014-home/> (17.11.2014).
2. Čorić T, Miler A. Izvješće o umrlim osobama u Hrvatskoj u 2013. godini. Hrvatski zavod za javno zdravstvo, 2014. http://hzjz.hr/wp-content/uploads/2014/08/umrli_2013.pdf (17. 11. 2014).
3. Kralj V, Šekerija M, Plažanin D. Age-specific trends in cardiovascular mortality rates in Croatia between 1998 and 2012. *Cardiol Croat.* 2014;9(9-10):417.
4. Krstacić G, Ivanušić M, Škerk V, et al. Public health action by the Institute for Cardiovascular prevention and rehabilitation on the occasion of World Heart Day 2014. *Cardiol Croat.* 2014;9(9-10):420.
5. Marroquin OC, Kelley DE. Obesity and metabolic syndrome. In: Griffin BP, Topol EJ. *Manual of cardiovascular medicine.* 2nd Edition. Lippincott, Williams & Wilkins; 2004, 27-35.
6. Aronson D, Rayfield EJ. Diabetes. In: Griffin BP, Topol EJ. *Manual of cardiovascular medicine.* 2nd Edition. Lippincott, Williams & Wilkins; 2004, 36-54.
7. Rader DJ. Lipid disorders. In: Griffin BP, Topol EJ. *Manual of cardiovascular medicine.* 2nd Edition. Lippincott, Williams & Wilkins; 2004, 55-75.
8. Henri HC, Rudd P. Hypertension: context and management. U: Griffin BP, Topol EJ. *Manual of cardiovascular medicine.* 2nd Edition. Lippincott, Williams & Wilkins; 2004, 88-108.
9. World Health Organisation. Global Database on Body Mass Index. <http://apps.who.int/bmi/> (17. 11. 2014).
10. de Divitiis O, Fazio S, Petitto M, et al. Obesity and cardiac function. *Circulation.* 1981;64:477-82. DOI: <http://dx.doi.org/10.1161/01.CIR.64.3.477>
11. Alpert MA. Obesity cardiomyopathy: pathophysiology and evolution of the clinical syndrome. *Am J Med Sci.* 2001;321:225-36. DOI: <http://dx.doi.org/10.1097/0000441-200104000-00003>
12. Steinberg HO, Chaker H, Leaming R, et al. Obesity/insulin resistance is associated with endothelial dysfunction. Implications for the syndrome of insulin resistance. *J Clin Invest.* 1996;97:2601-10. DOI: <http://dx.doi.org/10.1172/JCI118709>
13. Lavie CJ, De Schutter A, Patel DA, Romero-Corral A, Artham SM, Milani RV. Body composition and survival in stable coronary heart disease: impact of lean mass index and body fat in the 'Obesity paradox'. *J Am Coll Cardiol.* 2012;60:1374-80. DOI: <http://dx.doi.org/10.1016/j.jacc.2012.05.037>
14. Awtry EH, Gary J, Balady GJ. Exercise and physical activity. U: Griffin BP, Topol EJ. *Manual of cardiovascular medicine.* 2nd Edition. Lippincott, Williams & Wilkins; 2004, 76-87.
15. Sever PS, Dahlof B, Poulter NR, et al. Prevention of coronary and stroke events with atorvastatin in hypertensive patients who have average or lower-than-average cholesterol concentrations, in the Anglo-Scandinavian cardiac outcomes Trial-Lipid Lowering Arm (ASCOT-LLA): a multicentre randomised controlled trial. *Lancet.* 2003;361:1149-58. DOI: [http://dx.doi.org/10.1016/S0140-6736\(03\)12948-0](http://dx.doi.org/10.1016/S0140-6736(03)12948-0)
16. Mann JFE, Yi QL, Gerstein HC. Albuminuria as a predictor of cardiovascular and renal outcomes in people with known atherosclerotic cardiovascular disease. *Kidney Int Suppl.* 2004;66:S59-62. DOI: <http://dx.doi.org/10.1111/j.1523-1755.2004.09215.x>