

Article

Awareness, treatment, and control of hypertension among adult population in the Federation of Bosnia and Herzegovina over the past decade

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Significance for public health

In spite of wide knowledge of pathophysiology and epidemiology in development of hypertension, ability to easily diagnose it, availability of efficient medications, hypertension continues to have high prevalence and setting up hypertension controls poses significant public health challenge. Recently conducted cross-sectional population surveys in the Federation of Bosnia and Herzegovina give us opportunity to follow the trend for hypertension and implement public health measures to reduce or eliminate causes of high blood pressure in population and at the same time with implementation of medical treatment.

Abstract

Background. Many studies throughout the world show that hypertension is not effectively treated and controlled, which continued to pose an important challenge in health systems in the world.

Design and methods. Population surveys were carried out in 2002 and 2012 in the Federation of Bosnia and Herzegovina (FBIH) on representative sample at the age of 25-64. The surveys used systematic stratified sample. Questionnaires and anthropometric measure protocols were adapted from internationally recommended surveys.

Results. In the past ten years there has been a slight increase in hypertension prevalence in researched population (41% vs. 42%). Percentage of hypertensive male and female respondents who are not aware of their hypertension actually dropped in the past decade from 54.3% to 51.4%. In 2002 total number of hypertensive respondents aware of their hypertension included 8.1% of male respondents and 10.3% female respondents whose condition was not treated and this rate effectively dropped during the 10-year period. Number of hypertensive, treated, and uncontrolled respondents dropped as reported in the 2012 survey; consequently percentage of hypertensive, treated, and controlled respondents in the 2012 survey increased, in particular in female population.

Conclusions. Investments in primary health care, improved availability, and improved quality of health care in the FBIH in the past 10 years can explain increased rate of hypertension detection and treatment; however, efforts should be continued to introduce hypertension screening programs and hypertension control programs.

Introduction

High blood pressure (BP) accounts for almost 8 million deaths annually worldwide, which makes up approximately 13% of total mortality in the world. According to estimates from 2000, approximately 1 billion people suffered from hypertension and it is estimated that this

number could rise to 1.56 billion people by 2025.¹⁻³ Untreated and uncontrolled hypertension as a highly prevalent risk factor in cardiovascular diseases (CVD) causes cerebrovascular stroke, myocardial infarction, and cardiac arrest, but also dementia, renal failure and blindness.⁴

As the world is undergoing a substantial demographic transition characterized by increased number of aging population, as a consequence number of people suffering from hypertension increased from 600 million in 1980 to close to 1 billion in 2008. Increased hypertension prevalence is also caused by increased prevalence of unhealthy living styles and behaviour in population, primarily unhealthy diet habits, overweight and obesity, lack of physical activity, smoking, and exposure to constant stress. All this eventually leads to increased number of CVD cases, which if not treated properly, may cause premature death and disability, in particular in working population.⁵

However, many studies throughout the world show that hypertension is not effectively treated and controlled, which continued to pose an important challenge in health systems in the world. National health systems worldwide continue to struggle with inadequate hypertension management.⁶⁻⁹

Routine health statistics in the Federation of Bosnia and Herzegovina (FBIH) show that registered hypertension rate has been steadily on the rise and so has been worrying upward trend of CVDs plaguing the FBIH with high mortality rate among working active population.¹⁰ Available health statistical data on morbidity rates originate from the primary health care and as such they are simply tip of an iceberg based on the patient-demand on health care, not on real health needs of population. Health needs assessment of the population requires additional sensitive research, such as cross-sectional population surveys.

With the purpose of gathering consistent data on health status and health needs of the FBIH population, two major population surveys were carried out in the past decade on representative sample of adult population. Surveys included monitoring of risk factors in development of non-communicable diseases (NCD), including hypertension. In addition to monitoring blood pressure and hypertension prevalence, objective of the survey was also to evaluate extent of hypertension detection, treatment, and control in the FBIH, as well as to highlight changes in the 10-year trend.¹¹

Design and methods

Two cross-sectional population surveys as household surveys were conducted in 2002 and 2012 in the FBIH. In 2002 the target population was adult population aged 25-64 years, while in the 2012 the target population was adult population aged 18 years and over.

Sample designing, conducted by the Federal Institute of Statistics (FIS), was based on the estimated number of people, considering that

the last official census in Bosnia and Herzegovina (BIH) was in the year 1991. In a survey from 2002, a three-stage stratified systematic sample was applied, where the primary sampling units (first stage units) were enumeration areas prepared by FIS. A random selection of 151 segments was drawn. At the second stage, from each segment 20 households were randomly selected using a random number method. At the third stage, the survey team visited the selected households and listed all the persons aged 25-64 years living in the household. The survey subject was then randomly selected amongst these eligible persons living in the household. The total number of respondents was 2750 (1121 males and 1629 females), yielding response rate of 91%.

In a survey from 2012 was applied the two-stage stratified systematic sample, where the primary sampling units (first stage units) were enumeration areas prepared by FIS while secondary sampling units (second stage units) were households. Secondary sampling units were selected by systematic method, which meant that choice probabilities were same. The survey covered a total of 3843 respondents aged 18 and older, with an overall response rate of 97%. For purposes of comparison for the results of these two surveys, it was performed the data analysis for respondents aged 25-64, in total 2735 respondents, yielding response rate of 80%.

In addition to the questionnaires used to collect the data during face-to-face interviews, respondents' anthropometric values measures were measured including BP.

Questionnaires and anthropometric measure protocols were adapted from internationally recommended surveys.¹²⁻¹⁶

Fieldwork for both surveys was conducted as households surveys in the autumn-winter period.

BP was measured on a single occasion by trained interviewers using a mercury sphygmomanometer with an appropriate cuff size (Riester desk model), According to the WHO's MONICA Protocol, BP was measured in sitting position, on the right hand and after 5 minute rest and the values were read and recorded with the 2 mmHg accuracy. Two blood pressure measurements were done in 2002 and three were done in 2012 in intervals of 5 minutes. For analysis, it was used the mean of the 2 measurements in 2002 or the mean of the last 2 when 3 measurements were done.

The respondents were classified as hypertensive if their systolic blood pressure (SBP) was higher than 140 mmHg and/or diastolic blood pressure (DBP) was higher than 90 mm Hg and/or they were taking antihypertensive therapy. Based on the defined hypertension criteria,

use of antihypertensive drugs, and value of measured blood pressure, the hypertensive respondents were divided into 4 groups: *i) hypertensive respondents, not aware of hypertension; ii) hypertensive respondents, aware of hypertension, untreated; iii) hypertensive respondents, treated, uncontrolled; and iv) hypertensive respondents, treated, controlled.*

In addition to these definitions, other definitions were used of European Society of Hypertension (ESH) and the European Society of Cardiology (ESC) from 2013, whereby hypertension was classified in 3 grades. According to these definitions, grade I hypertension is a condition in which respondents reported values of SBP of 140-159 mmHg and/or DBP of 90-99 mmHg; grade II hypertension is a condition in which respondents reported values of SBP of 160-179 mmHg and/or DBP of 100-109 mmHg; and grade III hypertension is a condition in which respondents reported values of SKP >180 mmHg and/or DBP >110 mmHg.¹⁷

Statistical analysis

The obtained data were statistically analysed using SPSS 20 for Windows. Primary survey variables were respondents stratified on the basis of sex and age (four 10-year age groups - 25-34, 35-44, 45-54, and 55-64). Frequencies of awareness, treatment, or control were assessed on the basis of 10-year age groups. Results are reported as proportion and confidence interval (CI). Differences in frequency and sample means were tested by the chi-square test and ANOVA ($P < 0.05$ was considered to be statistically significant).

Results

Hypertension prevalence

In the 2002 survey hypertension prevalence in adult population reached 41%, similar as in the 2012 survey (42%). The prevalence of hypertension among male respondents in 2002 was 35.7% and among female respondents was 45.3%. In 2012, the prevalence of hypertension among male respondents was 43.9% and was higher than in 2002, while in 2012 the prevalence of hypertension among female respondents was 37.5% and was lower than in 2002. These differences were statistically significant ($P < 0.01$) (Figure 1)

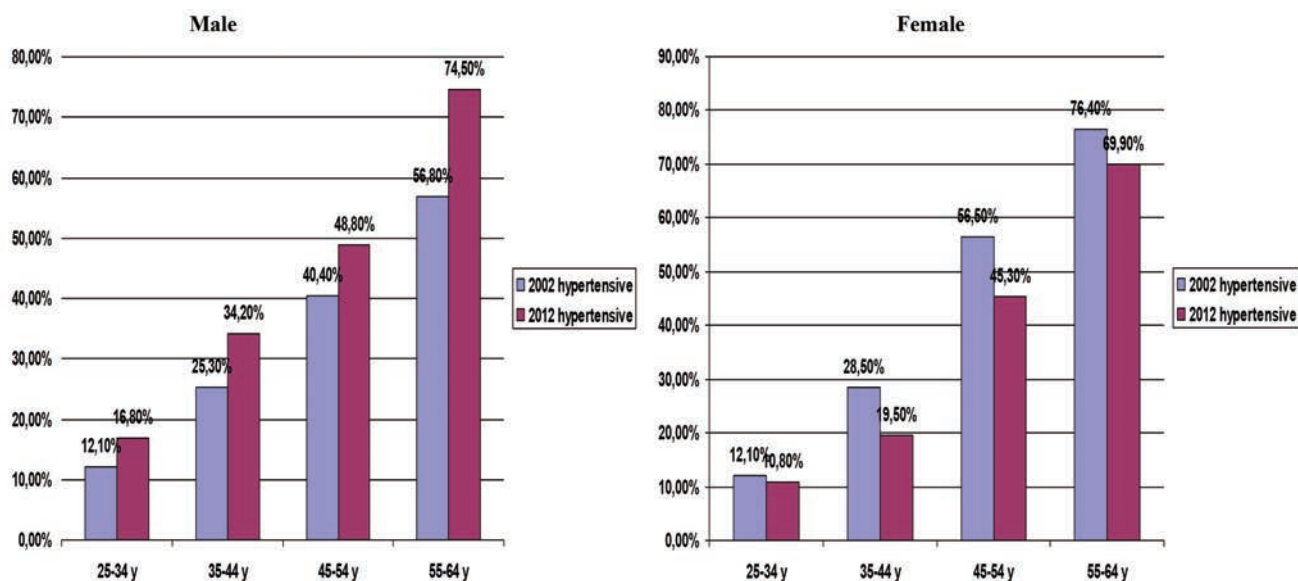


Figure 1. Hypertension prevalence by sex and age. Male $\chi^2(3)=113.3$, $P < 0.0001$, Female $\chi^2(3)=377.6$, $P < 0.0001$.

Hypertension awareness, treatment and control

Percentage of hypertensive male respondents who are not aware of their hypertension in the past ten years dropped from 63.4% to 59.7%, and in female respondents from 49.4% to 42.8%. The prevalence of hypertension awareness significantly increased with age in both male and female respondents.

In the 2002 survey in all hypertensive respondents who were aware of their hypertension, 8.1% of male respondents and 10.3% female respondents were not treated. Percent of hypertensive respondents who were treated was higher in female respondents (40.3%) than male respondents (28.5%). There were more hypertensive, treated, uncontrolled respondents in older age groups (age 45-64) and the percentage significantly increased with age of respondents. Percent of hypertensive treated and controlled respondents was low (males 4.8% *vs.* females 6.1%) and there was no significant difference by age or sex.

In the 2012 survey, in all hypertensive respondents who were aware of their hypertension, 4.7% of male respondents and 3% of female respondents was not treated, which is lower compared to the 2002 survey, in particular in females and there was significant difference by age or sex. Percent of hypertensive respondents who were treated was higher in female respondents (54.2%) than in male respondents (35.5%). Percentage of hypertensive, treated, uncontrolled respondents was higher in older age groups (age 45-64) and the percentage significantly increased with age of respondents. Percent of hypertensive treated and controlled respondents in males were 9%, and in females was 22.2%, which is substantially higher than that of reported in the

2002 survey (Table 1).

According to the definitions of European Society of Hypertension (ESH) and the European Society of Cardiology (ESC) from 2013, hypertension is classified in three grades: In the 2002 survey, prevalence of Grade I hypertension was equal in both female and male respondents.

Proportion of respondents with grade I hypertension statistically increased significantly with age in both female and male respondents ($P < 0.0001$). Ten years later, prevalence of grade I hypertension increased in male respondents (22.6% *vs.* 30.1%), while in female respondents prevalence of hypertension decreased (22.4% *vs.* 20.9%). Prevalence of grade II and grade III hypertension reported in the 2002 survey was higher in females and these values decreased in the 2012 survey and in male respondents grade II and grade III hypertension prevalence showed stagnation (Table 2).

Discussion and Conclusions

The aim of the paper was to estimate prevalence, awareness, treatment and control of hypertension in the FBIH over the past decade.

Two population surveys based on internationally methodology were carried out in 2002 and 2012. on a representative sample of adult population in the FBIH. Limitation of the survey is reflected in the categorization of hypertensive respondents based on one off blood pressure measurement, which in fact may lead to overrated hypertension levels, especially in patients who reported threshold values of SBP of 140

Table 1. Awareness, treatment and control of hypertension by sex and age.

Sex, age	Hypertensive, not aware			Hypertensive, not treated			Hypertensive, treated, not controlled			Hypertensive, treated, controlled		
	n.	%	(95% CI)	n.	%	(95% CI)	n.	%	(95% CI)	n.	%	(95% CI)
2002												
Male												
25-34	19	95.0	(83.3-100.0)	0	0.0		1	5.0	(0.0-16.7)	0	0.0	
35-44	75	87.2	(79.8-93.8)	6	7.0	(2.3-12.9)	1	1.2	(0.0-3.9)	4	4.7	(1.1-9.6)
45-54	81	62.8	(54.2-71.2)	15	11.6	(6.3-17.6)	28	21.7	(14.8-29.0)	5	3.9	(0.8-7.5)
55-64	74	46.8	(39.0-54.7)	11	7.0	(3.2-11.2)	63	39.9	(32.3-47.6)	10	6.3	(2.8-10.3)
Total	249	63.4	(58.6-68.1)	32	8.1	(5.5-10.9)	93	23.7	(19.5-28.0)	19	4.8	(2.8-7.1)
Female												
25-34	29	76.3	(61.5-89.2)	6	15.8	(5.3-28.6)	0	0.0		3	7.9	(0.0-17.6)
35-44	80	63.0	(54.4-71.2)	16	12.6	(7.1-18.8)	23	18.1	(11.7-25.0)	8	6.3	(2.4-10.9)
45-54	126	53.4	(47.1-59.8)	27	11.4	(7.6-15.7)	72	30.5	(24.8-36.5)	11	4.7	(2.1-7.6)
55-64	123	38.	(32.7-43.3)	26	8.0	(5.2-11.1)	153	47.2	(41.8-52.7)	22	6.8	(4.2-9.6)
Total	358	49.4	(45.6-53.0)	75	10.3	(8.2-12.6)	248	34.2	(30.7-37.7)	44	6.1	(4.4-7.8)
Total 2002	607	54.3	(51.3-57.2)	107	9.6	(7.9-11.3)	341	30.5	(27.7-33.3)	63	5.6	(4.3-7.0)
2012												
Male												
25-34	43	84.3	(73.4-93.8)	5	9.8	(2.2-18.9)	3	5.9	(0.0-13.2)	0	0.0	
35-44	74	70.5	(61.5-78.9)	8	7.6	(2.9-13.0)	13	12.4	(6.3-18.8)	10	9.5	(4.2-15.6)
45-54	107	64.1	(56.6-71.3)	5	3.0	(0.6-5.8)	44	26.3	(19.9-33.3)	11	6.6	(3.0-10.6)
55-64	107	46.3	(39.8-52.8)	8	3.5	(1.3-6.0)	87	37.7	(31.1-44.0)	29	12.6	(8.5-17.0)
Total	331	59.7	(55.7-63.8)	26	4.7	(3.0-6.5)	147	26.5	(22.9-30.3)	50	9.0	(6.7-11.5)
Female												
25-34	25	71.4	(55.2-86.1)	4	11.4	(2.5-23.1)	3	8.6	(0.0-19.0)	3	8.6	(0.0-18.9)
35-44	43	66.2	(54.1-77.8)	3	4.6	(0.0-10.4)	8	12.3	(4.8-20.8)	11	16.	(8.2-26.8)
45-54	83	43.9	(36.8-51.0)	4	2.1	(0.5-4.4)	57	30.2	(23.7-36.8)	45	23.8	(17.9-30.9)
55-64	78	31.7	(25.9-37.5)	5	2.0	(0.4-4.0)	103	41.9	(35.7-48.1)	60	24.4	(19.1-30.0)
Total	229	42.8	(38.7-46.9)	16	3.0	(1.6-4.6)	171	32.0	(28.1-35.9)	119	22.2	(18.7-25.9)
Total 2012	560	51.4	(48.4-54.4)	42	3.9	(2.8-5.0)	318	29.2	(26.6-31.9)	169	15.5	(13.4-17.7)

Table 2. Hypertension prevalence, by age and sex (ESH and ESC classification).

Age	Grade I			Grade II			Grade III		
	n.	%	(95% CI)	n.	%	(95% CI)	n.	%	(95% CI)
2002									
Male									
25-34	17	10.3	(5.9-15.1)	2	1.2	(0.0-3.1)	1	0.6	(0.0-2.0)
35-44	65	19.1	(15.0-23.4)	14	4.1	(2.2-6.4)	3	0.9	(0.0-2.0)
5-54	89	27.9	(23.0-32.9)	28	8.8	(5.8-12.0)	7	2.2	(0.7-4.0)
55-64	78	28.1	(22.7-33.3)	47	16.9	(12.7-21.5)	23	8.3	(5.1-11.6)
Total	249	22.6	(20.2-25.1)	91	8.3	(6.7-9.9)	34	3.1	(2.1-4.1)
Female									
25-34	31	9.8	(6.7-13.2)	4	1.3	(0.3-2.7)	0	0.0	
35-44	87	19.6	(15.9-23.3)	21	4.7	(2.8-6.8)	11	2.5	(1.1-4.0)
45-54	119	28.5	(24.2-32.9)	62	14.8	(11.5-18.3)	44	10.5	(7.7-13.6)
55-64	122	28.8	(24.4-33.2)	110	25.9	(21.7-30.3)	70	16.5	(13.1-20.1)
Total	359	22.4	(20.4-24.5)	197	12.3	(10.7-13.9)	125	7.8	(6.5-9.1)
Total 2002	608	22.5	(20.9-24.1)	288	10.7	(9.5-11.8)	159	5.9	(5.0-6.8)
2012									
Male									
25-34	38	12.5	(8.9-16.3)	9	3.0	(1.3-5.0)	3	1.0	(0.0-2.3)
35-44	83	27.0	(22.1-32.0)	12	3.9	(1.9-6.2)	5	1.6	(0.3-3.2)
45-54	122	35.7	(30.7-40.9)	26	7.6	(4.9-10.6)	11	3.2	(1.5-5.2)
55-64	137	44.2	(38.7-49.8)	59	19.0	(14.7-23.4)	17	5.5	(3.1-8.1)
Total	380	30.1	(27.6-32.6)	106	8.4	(6.9-9.9)	36	2.9	(2.0-3.8)
Female									
25-34	27	8.4	(5.5-11.5)	5	1.5	(0.3-3.0)	1	0.3	(0.0-1.0)
35-44	42	12.6	(9.1-16.4)	12	3.6	(1.8-5.7)	1	0.3	(0.0-1.0)
45-54	104	24.9	(20.9-29.1)	40	9.6	(6.8-12.5)	10	2.4	(1.0-4.0)
55-64	125	35.5	(30.6-40.5)	49	13.9	(10.4-17.6)	21	6.0	(3.6-8.5)
Total	298	20.9	(18.8-23.0)	106	7.4	(6.1-8.8)	33	2.3	(1.6-3.1)
Total 2012	678	25.2	(23.6-26.8)	212	7.9	(6.9-8.9)	69	2.6	(2.0-3.2)

mmHg and/or DBP of 90 mmHg. Although cross-sectional surveys are not ideal tools for evaluation, they are necessary to obtain information about individuals who have no contact with health professionals in health care institution, individuals who are not aware of their hypertension, level of treatment and control of hypertension.

Surveys showed that hypertension prevalence in the FBH is quite high; in the 2012 survey it was reported at 42% which is consistent with median values of hypertension in Europe and within reference value of SBP ≥ 140 mmHg and/or DBP ≥ 90 mmHg. Average hypertension prevalence in Europe in the past ten years was 44% and it ranged from 55% in Germany to 38% in Italy. In the US and Canada hypertension prevalence values are considerably lower at 29% and 19% respectively.¹⁸⁻²⁰ Compared to transition countries of the Southeast Europe, hypertension prevalence in the FBH is high, in particular when compared to Slovenia, Croatia, and Albania, but it is still lower than in Serbia.²¹⁻²⁴ In the neighbouring countries where lower hypertension prevalence is reported which is still not statistically significant but is very important in terms of epidemiology.

Of all hypertensive respondents included in the 2012 survey half of them still was not aware that they actually had hypertension, which is slight improvement compared to results of the 2002 survey (51.4% vs. 54.3%). These values are still considerably higher than in the US and Canada.²⁵ Among respondents who were aware of their hypertension, a total of four-fifths of them were treated and nearly one-fifth of them were controlled. Although there has been significant progress in increasing awareness, detection, treatment, and control of hypertension, these results showed that still do not have adequate blood pressure control. Percentage of hypertensive respondents who were aware

of their hypertension and not treated was significantly lower in 2012 survey which is explained by increased availability of antihypertensive drugs in the last ten years in the FBH. Similarly, hypertensive respondents who were treated were substantially higher and the results effectively improved when compared to the 2002 survey. The most significant improvement was in increasing percentage of treated and controlled female respondents over the ten years (6.1% vs. 22.2%). Generally, females are more aware of their hypertension, they are treated more often and their hypertension is better controlled than in males which corresponds with the results of population studies in many countries.^{26,27}

According to the hypertension classification of the European Society of Hypertension (ESH) and the European Society of Cardiology (ESC) from 2013, the results showed that the values of severe forms of hypertension reported in the 2012 survey were more common in males than in females and that the results significantly changed compared to values reported in the 2002 survey with noticeable increase of prevalence, in particular of grade 1 hypertension in males.

A significant progress has been made through primary health care using clinical guidelines applying better individual approach, but it still needs to work on population approach in developing a formal programme to control hypertension.

Investment of continued efforts to ensure further strengthening of integrated hypertension management, including also individual and population approaches, is necessary.

Changes to lifestyle can by all means lower BP and prevent hypertension while adequate pharmacological treatment can reduce cardiovascular episodes cause by hypertension. Investments in primary health

care, increased availability and improved quality of health care in the FBiH in the past ten years can explain increased hypertension detection and treatment rates; however, efforts should be continued to introduce hypertension screening programs and hypertension control programs. Additional attention should be paid to detection of hypertension at early age, in particular in male population.^{28,29}

At the same time public health measures should be implemented to reduce or eliminate causes of high pb, including reduced salt intake, increased fruit and vegetable intake, promotion of physical activity, all of which are recommendations of recently adopted WHO's Action plan for implementation of the European Strategy for the Prevention and Control of Non-communicable Diseases 2012-2016.³⁰ Introduction of cost-effective prevention programs for hypertension management in daily operations of primary health care teams will untimely improve quality of health care and ensure long-term reduction of cardiovascular and cerebrovascular disease burden.

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