ANALYSIS OF INCIDENCE AND PREVALENCE OF CARDIOVASCULAR RISK FACTORS AND EVALUATION OF THEIR CONTROL IN EPIDEMIOLOGICAL SURVEY IN THE CZECH REPUBLIC

Zdeněk Chmelík[1], Martina Vaclová[1], Věra Lánská[2], Jiří Laštůvka[1, 3], Michal Vrablík[1]

[1]Third Department of Internal Medicine, Department of Endocrinology and Metabolism, First Medical Faculty, Charles University and General Faculty Hospital, Prague, Czech Republic
[2]Department of Hygiene, Institute of Clinical and Experimental Medicine, Prague, Czech Republic
[3]Internal Department, Masaryk Hospital, Ústí nad Labem, Czech Republic

SUMMARY

Objective: The aim of this analysis was to analyze the presence of the most important cardiovascular (CV) risk factors and to discuss patterns of LDL cholesterol management in the population studied.

Methods: We enrolled 961 males, average age of 42.9 ± 4.7, and 851 females, average age of 51.2 ± 3.6. Data on personal, pharmacological and family history, and laboratory examinations were collected. Cardiovascular (CV) risk was calculated using the Systematic Coronary Risk Evaluation (SCORE) algorithm with modifications according to the guidelines.

Results: The distribution of CV risk in the observed cohort was as follows: 24% of the subjects had low, 51% moderate, 17% high and 8% very high risk. The percentage of patients who reached target values of LDL cholesterol was dramatically lower in the groups with very high (1%) and high (3%) risk than in the groups with moderate (14%) or low risk (59%). Dyslipidemia was newly identified in 20% of both sexes. Arterial hypertension was newly diagnosed in 8% of males and 5% of females, and type 2 diabetes mellitus was newly diagnosed in 3% of both the males and females. Dyslipidemia was present in 39% of males and 41% of females; arterial hypertension in 43% of males and 45% of females, and type 2 diabetes mellitus was diagnosed in 11% of the subjects of both sexes. 49% of males and 31% of females were overweight and 32% of both genders were obese. There were 36% of male smokers and 22% of female smokers. 48% of the participants were pharmacologically treated. Non-pharmacological treatment was recommended to 62% of male and to 65% of female participants. Pharmacological intervention was started in 53% of males and 51% of females. In both gender antihypertensive treatment with angiotensin-converting enzyme (ACE) inhibitors (29% of males and 27% of females) and lipid lowering therapy with a statin (28% of males, 27% of females) were the most commonly initiated treatments. In the subgroup of the 101 patients with LDL cholesterol levels > 5 mmol/L 56% were not treated with a statin. The analysis of relationship between the positive family history of any of the followed CV risks showed significant increases of the risk for arterial hypertension, type 2 diabetes mellitus and dyslipidemia.

Conclusion: European guidelines suggest general screening for risk factors, including analysis of lipid profiles in the population of 40-year-old males and 50-year-old or postmenopausal women. Our study documents high prevalence and incidence of CV risk factors together with insufficient control of the risk factors in Czech patients of this age range. This finding suggests that preventive examinations should be undertaken earlier (e.g., in 30-year-old males and 40-year-old women). Exact timing of the preventive check-ups to yield the best cost-benefit ratio needs to be verified.

Key words: screening, risk factors, SCORE, LDL cholesterol, familiar hypercholesterolemia

Address for correspondence: Z. Chmelík, Third Department of Internal Medicine, First Faculty of Medicine, Charles University and General Faculty Hospital in Prague, U Nemocnice 1, 128 08, Prague 2, Czech Republic. E-mail: chmelik.zdenek@gmail.com

https://doi.org/10.21101/cejph.a5730

INTRODUCTION

Preventive examinations performed by primary care physicians represent an important tool in the management of cardiovascular (CV) risk. Recent European guidelines for the prevention of CV diseases in clinical practice suggest screening for risk factors, including analyses of lipid profiles in the population of 40-year-old males and 50-year-old or postmenopausal women (1).

LDL cholesterol levels represent the most important modifiable CV risk factor. Recently, there have been data series from interventional and epidemiological studies, e.g., AMORIS, INTERHEART, that confirm the relationship between the development of CV diseases and LDL cholesterol concentrations (2, 3).

Moreover, additional data provided evidence of equal importance of the intervention timing when assessing efficacy of preventative measures (4).

Risk stratification, e.g. using the Systematic Coronary Risk Evaluation (SCORE) algorithm, represents the initial step for selection of the right preventive approach and decision on strategies of intervention (e.g. therapeutic lifestyle changes alone or complemented with pharmacological measures).

The aim of this analysis was to analyze the presence of the most important CV risk factors and to discuss patterns of LDL cholesterol management in the population studied.

MATERIALS AND METHODS

The data collection took place over a 4-month period. A total of 167 primary care physicians were chosen from the whole Czech Republic evenly to cover all different regions of the country. The participating physicians were asked to collect data on 10 consecutive patients who visited them for the purpose of preventive examination (cross-sectional study). Questionnaires were obtained from 1,812 patients, 961 males and 851 females, who complied with the age criteria: average 40 years of age for males and 50 for women. Heart rate, blood pressure, body mass index (BMI) and laboratory parameters including blood lipids and glycaemia, together with data from the subjects' medical history (e.g. personal and family history, with a particular emphasis on the presence of type 2 diabetes mellitus, arterial hypertension and dyslipidemia) were collected. Dyslipidemia was defined as the presence of at least one of the following criteria: total cholesterol > 5.0 mmol/L, LDL cholesterol > 3.0 mmol/L, triglycerides > 1.7 mmol/L, and HDL cholesterol < 1.0 mmol/L in males and < 1.2 mmol/L in females. Family history of type 2 diabetes mellitus, arterial hypertension and dyslipidemia was recorded; positive family history of premature CV disease was defined as its manifestation under the age of 55 years of age in male first-degree relatives and 65 years of age in first-degree female relatives. Laboratory parameters were obtained from accredited local laboratory and the primary care physicians participating in the study were responsible for evaluation of their clinical significance. Participating physicians were responsible for correct diagnosis in case of newly identified risk factor.

The data was statistically processed. The averages, medians, standard deviations and 1st and 3rd quartiles were calculated for the whole cohort. CV risk was estimated using SCORE charts modified according to the guidelines. Hypothesis of a relationship between positive family history of any of the followed risk factors and its risk in the examined probands was tested using Pearson's test.

RESULTS

Clinical Characteristics of the Cohort

The basic clinical characteristics of the cohort are shown in Table 1. The average age of the males was 42.9 ± 4.7, and the females 51.2 ± 3.6.

Prevalence of Main CV Risk Factors

Arterial hypertension was present in 43% of males and 45% of females. Type 2 diabetes mellitus was present in 11% of both sexes.

Newly Diagnosed CV Risk Factors

Dyslipidemia was the most frequent new diagnosis being newly identified in 20% of the subjects of both sexes. Arterial hypertension was newly detected in 8% of males and 5% of females, and new diabetes mellitus was identified in 3% of the subjects of both sexes.

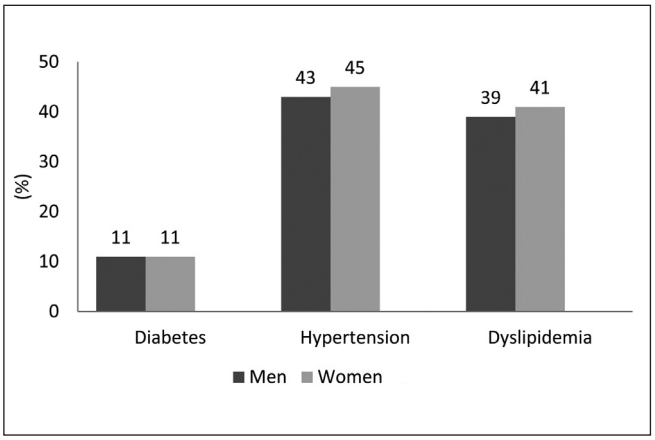

Fig. 1. *Presence of main CV risk factors.*

Table 1. *Basic clinical characteristics of the cohort (N = 1,812)*

Gender	Age (years)	Triglycerides (mmol/L)	Total cholesterol (mmol/L)	LDL cholesterol (mmol/L)	HDL cholesterol (mmol/L)	Glycaemia (mmol/L)
Male	42.9 ± 4.7	2.01 ± 1.29	5.52 ± 1.10	3.47 ± 1.05	1.37 ± 0.78	5.24 ± 1.14
	$Q_{0.25}$ = 41.1	$Q_{0.25}$ = 1.23	$Q_{0.25}$ = 4.81	$Q_{0.25}$ = 2.80	$Q_{0.25}$ = 1.02	$Q_{0.25}$ = 4.71
	$Q_{0.50}$ = 41.2	$Q_{0.50}$ = 1.71	$Q_{0.50}$ = 5.42	$Q_{0.50}$ = 3.33	$Q_{0.50}$ = 1.25	$Q_{0.50}$ = 5.12
	$Q_{0.75}$ = 43.1	$Q_{0.75}$ = 2.34	$Q_{0.75}$ = 6.21	$Q_{0.75}$ = 4.01	$Q_{0.75}$ = 1.50	$Q_{0.75}$ = 5.63
Female	51.2 ± 3.6	1.61 ± 1.05	5.55 ± 1.06	3.38 ± 1.00	1.55 ± 0.64	5.21 ± 1.19
	$Q_{0.25}$ = 51.3	$Q_{0.25}$ = 0.97	$Q_{0.25}$ = 4.87	$Q_{0.25}$ = 2.74	$Q_{0.25}$ = 1.20	$Q_{0.25}$ = 4.60
	$Q_{0.50}$ = 51.2	$Q_{0.50}$ = 1.38	$Q_{0.50}$ = 5.44	$Q_{0.50}$ = 3.21	$Q_{0.50}$ = 1.49	$Q_{0.50}$ = 5.02
	$Q_{0.75}$ = 52.1	$Q_{0.75}$ = 1.90	$Q_{0.75}$ = 6.14	$Q_{0.75}$ = 3.92	$Q_{0.75}$ = 1.80	$Q_{0.75}$ = 5.56

BMI and Smoking Habits

49% of males and 31% of females were overweight and 32% of both genders were obese. 36% of men and 22% of women were active smokers.

SCORE Risk Distribution

The SCORE distribution in the population studied is shown in Table 2.

LDL Cholesterol Analysis

The results of distribution of cholesterol levels in subgroups stratified by SCORE are shown in Figure 3. Figure 4 shows the same results but taking into account older version of the European guidelines allowing comparison of the same population before and after publication of the most recent guidelines (5).

Subgroup of Patients with Possible Familial Hypercholesterolemia

Figure 3 shows actual CV risk as calculated using SCORE and LDL cholesterol levels. LDL cholesterol in patients in level 3 exceeds 5 mmol/L; thus, these patients may have familial hypercholesterolemia (FH). There were 101 patients who met this criterion. The basic clinical features of this subgroup are presented in Table 3.

Table 2. *SCORE distribution in the observed population (N = 1,531)*

Score	< 1%	1–5%	5–10%	> 10%
Patients (%)	24	51	17	8

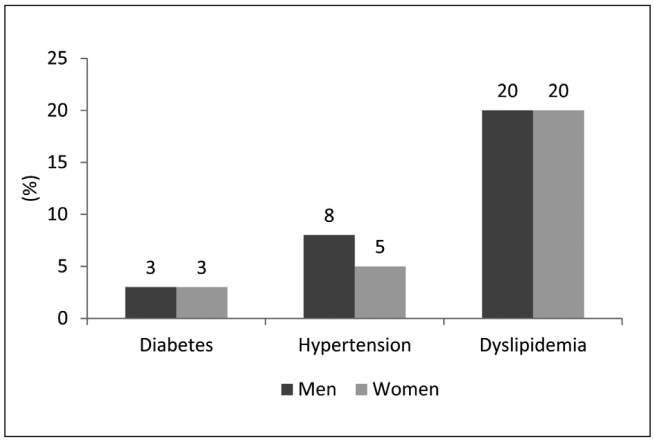

Fig. 2. *Newly identified main CV risk factors.*

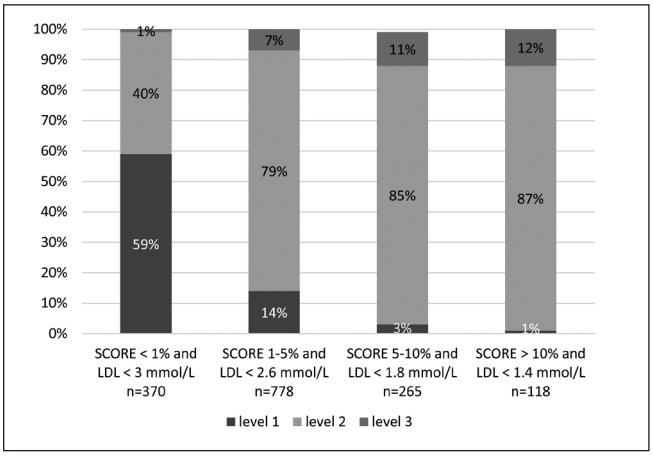

Fig. 3. *SCORE and LDL cholesterol levels – recent guidelines (1).*

Level 1 – for SCORE < 1% = LDL < 3 mmol/L, for SCORE 1–5% = LDL < 2.6 mmol/L, for SCORE 5–10% = LDL < 1.8 mmol/L, for SCORE > 10% = LDL < 1.4 mmol/L
Level 2 – for SCORE < 1% = LDL > 3 mmol/L, for Score 1–5% = LDL > 2.6 mmol/L, for SCORE 5–10% = LDL > 1.8 mmol/L, for SCORE > 10% = LDL > 1.4 mmol/L
Level 3 – for SCORE < 1% = LDL > 5 mmol/L, for SCORE 1–5% = LDL > 5 mmol/L, for SCORE 5–10% = LDL > 5 mmol/L, for SCORE > 10% = LDL > 5 mmol/L

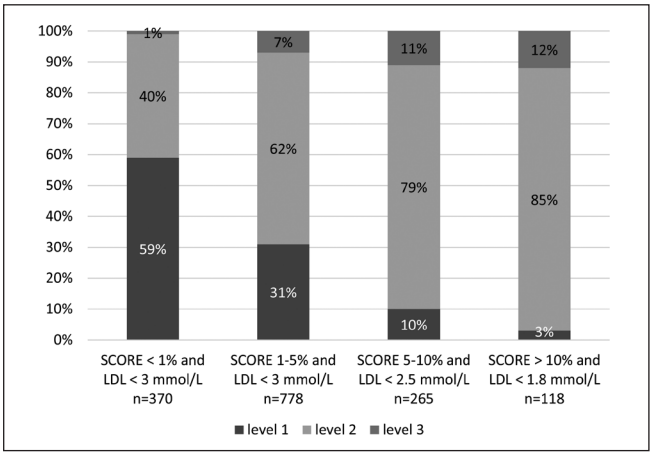

Fig. 4. *SCORE and LDL cholesterol levels – older guidelines (5).*

Level 1 – for SCORE < 1% and 1–5% = LDL < 3 mmol/L, for SCORE 5–10% = LDL < 2.5 mmol/L, for SCORE > 10% = LDL < 1.8 mmol/L
Level 2 – for SCORE < 1% and 1–5% = LDL > 3 mmol/L, for SCORE 5–10% = LDL > 2.5 mmol/L, for SCORE > 10% = LDL > 1.8 mmol/L
Level 3 – for SCORE < 1% and 1–5% = LDL > 5 mmol/L, for SCORE 5–10% = LDL > 5 mmol/L, for SCORE > 10% = LDL > 5 mmol/L

Analysis of Family History

Positive family history was evaluated in both genders for arterial hypertension, type 2 diabetes mellitus and dyslipidemia. As expected, positive family history was associated with an increased prevalence of the risk factors in the study subjects in both sexes. Positive family history was associated with and increased risk of

Table 3. *Basic clinical characteristics of the set of patients with LDL > 5 mmol/L (N = 101)*

Gender	Age (years)	Triglycerides (mmol/L)	Total cholesterol (mmol/L)	LDL cholesterol (mmol/L)	HDL cholesterol (mmol/L)	Glycaemia (mmol/L)
Male	41.1 ± 3.9	2.63 ± 1.65	7.1 ± 1.49	5.93 ± 0.89	1.30 ± 0.58	5.29 ± 1.22
Female	51.2 ± 1.2	2.08 ± 1.64	7.46 ± 0.99	5.94 ± 0.81	1.31 ± 1.64	5.33 ± 0.98

arterial hypertension by 2.7 times in men and 3.6 times in women, the risk of type 2 diabetes mellitus was increased 5 times in men and 5.7 times in women, dyslipidemia in the family history increased the risk by 3.5 in men and 2.3 in women.

Treatment Patterns Analysis

Non-pharmacological treatment was recommended to 62% of male and to 65% of female participants. Pharmacological treatment was started in 53% of males and 51% of females. The most prescribed treatments in both genders were antihypertensive drugs, particularly angiotensin-converting enzyme (ACE) inhibitors (29% of males and 27% of females) and lipid lowering drugs, particularly statins (28% of males, 27% of females).

DISCUSSION

Laboratory values correspond to those patients identified in surveys as representative samples of the population.

Prevalence of arterial hypertension and type 2 diabetes mellitus were slightly higher than those presented by the Czech Hypertension Society (6) or the Institute for Health Statistics (7); this discrepancy was possibly caused by the fact that persons treated for these diseases were visiting their doctors for preventive examinations more frequently. Dyslipidemia was a known diagnosis in 39% of males and 41% of females. It can be estimated from these data that dyslipidemia remains a problem, despite a decrease in the average LDL cholesterol levels recorded in longitudinal trends of CV risk factors in the Czech population (8).

Data associated with newly diagnosed CV risk factors are among the most important findings of the survey. The dyslipidemia definition used in the survey should be taken into consideration when evaluating the finding results. The definition was identical to that used in the MONICA study where at least one of the following parameters was present: total cholesterol > 5 mmol/L, LDL cholesterol > 3 mmol/L, triglycerides > 1.7 mmol/L, and HDL cholesterol < 1.0 mmol/L in males and < 1.2 mmol/L in females. Data showed that dyslipidemia was the most frequently diagnosed CV risk factor in the survey, and that despite the positive trend of LDL cholesterol decrease in the population observed recently, dyslipidemia remains significantly underdiagnosed and undertreated.

More than 80% of men and almost two thirds of women had not optimal body weight (overweight and obesity). Although BMI is not an ideal tool in terms of predicting CVD risk, body weight exceeding normal ranges modifies the risk of CVD. It is interesting to compare the data from MONICA and post-MONICA surveys, where the prevalence of overweight and obesity was 78.6% for men and almost 58.3% for women (8). Thus, the results of our survey are in line with the general population sample observations and documents continuing unsatisfactory control of this risk modifier in the population at risk. Also, our survey confirmed similarly unsatisfactory trend of smoking habits. Not only there was no decrease of the proportion of smokers in the population studied compared to the general population, but the number of smokers in our cohort seemed to have even higher smoking prevalence. There were 36% of regular smokers among men and 22% among women in our survey, while the corresponding numbers in the general population were 30% for men and 19% for women. This finding does not seem to be surprising as investigators of the EUROASPIRE studies have failed to document any significant decreases of smoking in the cohorts of patients with established diagnosis of coronary artery disease (9).

The SCORE algorithm is an important and useful (though limited) tool for the stratification of CV risk. According to the recent guidelines it is recommended to consider also additional risk factors that can modify risk calculated by the SCORE system. These risk modifiers comprise e.g., socioeconomic status, chronic kidney disease, autoimmune disease, etc. Nearly one-quarter of the examined patients had high or even very high cardiovascular risk as assessed by the participating physicians. Given the young age of the cohort followed it seems likely the participating physicians-investigators used the risk modifiers accordingly to upgrade the risk category when indicated.

The distribution of LDL cholesterol levels in different CV risk categories as determined by the SCORE was studied. In particular, we were interested in whether the patients achieved the LDL cholesterol values recommended for their rate of CV risk e.g., 3 mmol/L for low, 2.6 mmol/L for moderate risk, 1.8 mmol/L for high risk, and 1.4 mmol/L for very high risk. The results are shown in Figure 3.

These data indicate that the proportion of examined patients who meet the above-mentioned target values decreases with increasing risk. Especially in the category of very high risk, the goal to achieve a very ambitious level of LDL cholesterol of 1.4 mmol/L is very challenging. Several reasons for this observation might be postulated. Non-adherence to therapy, that is common for patient treated with either lipid lowering or antihypertensive drugs, can play a central role.

Familiar hypercholesterolemia (FH) is a serious congenital disease characterized by high LDL cholesterol levels. Patients with this condition present with premature clinical manifestations of coronary artery disease (CAD) and/or other atherothrombotic vascular complications. Fatal or nonfatal coronary events manifest in more than 50% of males aged below 50 years and 30% of females aged below 60 years in the population with FH (10). Timely diagnosis and subsequent treatment with statins result in a significant reduction in mortality and morbidity in these patients (11). Thus, early identification and intervention in FH is an approach bringing the affected subjects (as well as their families) utmost benefit.

All individuals with LDL cholesterol levels exceeding 5 mmol/L might be carriers of mutations leading to the phenotype undistinguishable from FH. Also, these patients are candidates for early hypolipidemic, primarily statin, therapy. In this respect, it is interesting, though perhaps not positive, that only 44% of this subpopulation were being treated with a statin whereas 56% were not. This situation could be theoretically even more serious if we had more detailed information concerning statin posology. Data indicate to a certain degree that the doses of statins might have been insufficient in some patients.

Findings regarding analysis of family history is in accordance with the work of Piťha et al. (12) where positive family history and smoking were among strongest predictors of acute coronary syndrome.

Recommendation for non-pharmacological treatment to 62% of men and 65% of women at the end of the examination can be surprising especially when taking into account results from the

survey where even in the subgroup with low CVD risk 41% of patients had LDL cholesterol over 3 mmol/L. Non-pharmacological interventions are universal and at the same time they do not have side effects in terms of classical adverse drug reactions. They can be considered as synonymous with a healthy lifestyle, which helps to positively influence many diseases, not only CVD (13), so all patients should be motivated to follow them.

Pharmacotherapy was initiated in every second participant in the survey (53% of men and 51% of women). Analysis showed that antihypertensive drugs, namely ACE inhibitors, beta blockers, calcium channel blockers, and sartans were the most common ones. Taking into account the prevalence of hypertension in the Czech Republic (6) and the need to treat many patients with two or three combinations of drugs, we consider this finding to be expected. Also, the choice of antihypertensive drugs is not surprising, all of the above-mentioned groups are among the first line treatments.

The second most commonly prescribed group of drugs was lipid lowering drugs, namely statins. This might be viewed as a positive trend as there is very strong evidence documenting positive effects on CV morbidity and mortality with statin administration (14).

CONCLUSION

Our data show that both the prevalence and the incidence of the main CV risk factors were high in the population studied. The control of risk factors was also unsatisfactory, LDL cholesterolemia showing the poorest control among all the risk factors studied. These conclusions clearly indicate a need for continued preventive examinations since the target population (i.e. males aged 40 years and females aged 50 or after menopause) may significantly benefit from them.

Our survey showed that the SCORE algorithm is an important and useful tool for risk stratification. Like any other tool, it has its limitations. The SCORE algorithm predicts only the risk of fatal CV events and only over a 10-year period. However, if we are considering preventive measures, we should also take into account nonfatal events that may have a significant impact on the quality of life. Moreover, the presence of just one single risk factor substantially increases long-term of life-long cardiovascular risk (15). For young individuals, evaluation of relative risk can be recommended with the aim of educating these individuals. The SCORE algorithm cannot be used universally, and it should be further tailored for some populations. Individuals who have a sedentary way of life; are socially deprived; or have type 1 diabetes without organ complications, low HDL cholesterol, increased triglycerides, preclinical atherosclerosis (morphological changes in blood vessel walls), changes in the thickness of intima-media complex, calcifications and some other conditions as reviewed by the guidelines shall be reclassified and their risk category upgraded.

LDL cholesterol analysis showed that on top of the problem of insufficient treatment, a group of patients with suspected FH could have been identified. These patients represented more than 5% of the whole set of patients, which is a relatively large and appreciable group with regard to the impact of FH diagnosis on the whole subjects' families.

Our survey showed relationship between positive family history and the risk of the disease in a patient. Family history assessment is the simplest yet very effective "examination" of the genetic component of the cardiovascular risk and should be considered when assessing the overall patient's risk.

Absence of information regarding lifestyle belongs to the limitation of this survey as it plays an important role in the overall risk score.

The aim of preventive examination is to identify groups of patients at risk and to initiate individualized intervention. However, there are limitations why individualized risk factor management cannot be offered to the entire population. Therefore, setting an age limit is very important for effective and cost-benefit preventive measures. Our data suggest it is worthwhile to initiate general preventive check-ups to assess CV risk in detail warranted 10 years earlier in the Czech population then recommended by the guidelines.

Acknowledgement

The author would like to thank the participating physicians for their help in completing the project and to the company Richter Gedeon for help with data collection. Work was also partially supported by grant AZV MR ČR NV18-01-00161.

Conflict of Interests

None declared

REFERENCES

1. Piepoli MF, Hoes AW, Agewall S, Albus C, Brotons C, Catapano AL, et al. 2016 European Guidelines on cardiovascular disease prevention in clinical practice: The Sixth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of 10 societies and by invited experts). Eur Heart J. 2016;37(29):2315-81.
2. Walldius G, Jungner I, Holme I, Aastveit AH, Kolar W, Steiner E. High apolipoprotein B, low apolipoprotein A-I, and improvement in the prediction of fatal myocardial infarction (AMORIS study): a prospective study. Lancet. 2001;358(9298):2026-33.
3. Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum A, Lanas F, et al.; INTERHEART Study Investigators. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. Lancet. 2004;364(9438):937-52.
4. Vrablík, M. Treatment of hypertension for a long-term satisfaction of the patient as well as the physician. Practicus. 2015;14(6):22-4. (In Czech.)
5. Perk J, De Backer G, Gohlke H, Graham I, Reiner Z, Verschuren M, et al. European Guidelines on cardiovascular disease prevention in clinical practice (version 2012). The Fifth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of nine societies and by invited experts). Eur Heart J. 2012;33(13):1635-701.
6. Filipovský J, Widímský J Jr, Ceral J, Cífková R, Horký K, Linhart A, et al. Diagnosis and treatment of arterial hypertension. 2012 Guidelines of the Czech Hypertension Society. Vnitr Lek. 2012;58(10):785-801. (In Czech.)
7. Czech Health Statistics Yearbook. Prague: Institute of Health Information and Statistics of the Czech Republic; 2013. (In Czech, English.)
8. Cífková R, Skodová Z, Bruthans J, Adámková V, Jozífová M, Galovcová M, et al. Longitudinal trends in major cardiovascular risk factors in the Czech population between 1985 and 2007/8. Czech MONICA and Czech post-MONICA. Atherosclerosis. 2010;211(2):676-81.
9. Mayer O Jr, Bruthans J, Timoracká K; Czech EUROASPIRE I-IV investigators. The changes in cardiovascular prevention practice between 1995 and 2012 in the Czech Republic. A comparison of EUROASPIRE I, II, III and IV study. Cor Vasa. 2014;56(2):e91-7. doi: 10.1016/j.crvasa.2014.01.008.

10. Marks D, Thorogood M, Neil HA, Humphries SE. A review on the diagnosis, natural history, and treatment of familial hypercholesterolaemia. Atherosclerosis. 2003;168(1):1-14.
11. Austin MA, Hutter CM, Zimmern RL, Humphries SE. Familial hypercholesterolemia and coronary heart disease: a HuGE association review. Am J Epidemiol. 2004;160(5):421-9.
12. Piťha J, Staněk V, Aschermann M, Skalická H, Matoušková J, Kruger A, et al. Influence of a positive family history on the age of manifestation of an acute coronary syndrome and on the cardiovascular risk factors in females. 17th Congress of the Czech Coronary Society, May 10-13, 2009, Brno. Cor Vasa. 2009;51 Suppl. (In Czech.)
13. Vrablík M, et al. Question marks in cardiovascular prevention 2009. Brno: Facta Medica; 2009. (In Czech.)
14. Soška V, Vaverková H, Vrablík M, Bláha V, Cífková R, Freiberger T, et al. Position statement of the Executive Board of Czech Society for Atherosclerosis to the ESC/EAS Guidelines for the management of dyslipidaemias 2011. Diabetol Metab Endokrinol Vyz. 2013,16(1):26-31. (In Czech.)
15. Genest J, Frohlich J, Fodor G, McPherson R; Working Group on Hypercholesterolemia and Other Dyslipidemias. Recommendations for the management of dyslipidemia and the prevention of cardiovascular disease: summary of the 2003 update. CMAJ. 2003;169(9):921-4.

Received March, 2 2019
Accepted in revised form May, 6 2020