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ORIGINAL ARTICLE

RISK OF CARDIOVASCULAR DISEASES IN IMMIGRANTS FOR CHOSEN NATIONALITIES AND LOCATIONS IN THE CZECH REPUBLIC

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Abstract
Topic of this article is based on research results from a project named "Health and social situation of immigrants and recognized refugees living in the Czech Republic" (reg. n. OC 10031) adopted by the COST Grant Agency (abbr. COST – Cooperation on Scientific and Technical Research) and financed during the period of 2010 through to May 2011. The research question posed, namely "whether chosen characteristics of social situation are related to chosen aspects of health", stems from the conceptual frame of social determinants of health. Target group for this research are the following nationalities: Ukrainians, Vietnamese and Mongolians between the ages 18 and 65, 246 respondents in total. In terms of this research the occurrence of three influenceable risk factors of cardiovascular diseases, namely smoking, hypertension and obesity was questioned. Based on the BMI of the respondents, their morbidity risk was also evaluated. This indicator was statistically tested related to non-influenceable risk factors of cardiovascular diseases (gender, age) and to other social variables (occupation type, education, occupation category). By statistical testing the significance level of $\alpha = 0.05$ was statistically significant for dependence between smoking and the immigrant gender ($p = 0.000$), age ($p = 0.000$) and nationality ($p = 0.001$). On the same level of significance dependence of exposure to smoky environment and occupation category was also statistically proven ($p = 0.012$). On a lower significance level of $\alpha = 0.05$ statistically significant dependence between smoking and occupation type ($p = 0.372$) and education of respondents ($p = 0.884$) was not found. On the significance level of $\alpha = 0.05$ the morbidity risk according to BMI evaluation of the respondents was found statistically significantly dependent on gender (0.014), age ($p = 0.000$) and nationality of the respondents ($p = 0.000$).

Key words: *risks factors; cardiovascular diseases; foreigners; social determinants of health; Czech Republic*

INTRODUCTION

Current interest in the broader definition of health conceptually seen through its social determinants is shown not only by the profuse discussion in renowned scientific journals (see Social Science & Medicine, Int. J. Public Health, European J. Public Health, American J. Public Health, International Arch. Occup. Environ. Health etc.), but also by the fact that WHO initiated foundation of the Commission on Social Determinants of Health – further CSDH), that claims

that social determinants are significant when the causes for health discrepancies are sought (Equity, social determinants and public health programmes, WHO 2010). It is therefore evident that WHO also sees the phenomenon of health through the social determinant concept and therefore in fact recognizes the reached scientific conclusions inferring the connections between chosen aspects of social situation and health (seen objectively or subjectively). With this insight there is a potential, according to Berkman and Sivaramakrishnan (2008) for the organisation (WHO) to help countries around the world to overcome health problems caused by social and environmental conditions.

The research question posed, namely "whether chosen characteristics of social situation are related to chosen aspects of health", stems from the conceptual frame of social determinants of health published by Wilkinson and Marmot in 2003 in Copenhagen.

Connection between the chosen characteristics of social situation and cardiovascular diseases has been confirmed in many research studies (Beaglehole and Magnus 2002, Avendano et al. 2005, Ellaway and Macintyre 2007, Baum 2009, Harper et al. 2011). Many cardiovascular diseases (CVD) have a common cause, namely atherosclerosis. This disease of the arteries is caused by fatty substances and secondly calcium being gradually deposited in their walls deteriorating artery flexibility and consecutively narrowing (to obliteration) artery diameter, subsequently causing ischemia in the corresponding part of the organism (Vokurka et al. 2004, p. 81). According to Provazník et al. (2004) atherosclerosis development takes decades and its initial stages can be shown as early as in childhood years. Among atherosclerotic diseases belong ischemic heart disease (IHD), peripheral vascular disease (PVD), ischemic renal disease (ICHL) and cerebrovascular accident (CVA) of primarily ischemic aetiology. Atherosclerosis is a multifactorially conditioned disease, which implies that the probability of its occurrence is elevated by several risk factors. A risk factor is here a variable that significantly elevates the probability of manifestation of the given disease, without actually causing it. Risk factors of CVD can be divided based on different point of view. Provazník et al. (2004) divides the CVD risk factors into influenceable, non-influenceable, traditional and non-traditional. Smoking, dyslipidaemia, hypertension, diabetes mellitus of the second type, the metabolic syndrome, obesity firstly of the abdominal type, insufficiency of antioxidating substances from food, insufficiency of exercise, elevated homocystein levels in blood and elevated levels of lipoprotein (a) in serum belong to the traditional risk factors of CVD. Age, gender, genetic factors, positive family history and ethnicity are often referred to as the non-influenceable CVD factors. The good news is that the outbreak of the CVD diseases can be postponed or their implications reduced by healthy lifestyle (Škrla and Škrlová 2003). With slight exaggeration it can be stated: "Bad genetics is a loaded gun and your life-style is the finger on the trigger" (Škrla and Škrlová 2003, p. 461).

Recently so called non-traditional factors have been mentioned beside the traditional ones. Among them belong elevated endogenous iron reserves, infection (above all *Chlamydia pneumonia*), general chronic infections (prolonged higher CRP levels), and high levels of fibrogen in blood. Other authors list psycho-sociological factors such as chronic stress or mentally demanding occupation among these non-traditional factors (Provazník et al. 2004, Kebza, 2005).

The aim of the research project was to: Map the chosen risk factors of cardiovascular diseases for the research group of immigrants. Evaluate morbidity risk in the respondents according to BMI. Statistically analyse the connection between chosen indicators of social situation and morbidity risk of respondents.

MATERIAL AND METHODS

Quantitative strategy, the questionnaire technique, was chosen for data collection. The questionnaire was translated into four languages (Mongolian, Vietnamese, Ukrainian and Russian) and distributed to 246 respondents in chosen region of the Czech Republic (Prague, South Bohemian region, region Vysočina). Part of Ukrainian

respondents (originating from the Eastern part of the country) preferred the written text in Russian language. Therefore the questionnaire was translated into both Ukrainian and Russian. Following criterions were chosen for the investigation of the influence of risk factors on the onset of cardiovascular diseases:

Non-influencable risk factors of CVD:

- ***Gender*** – from the total number of 246 respondents (100%) 148 were women (60.2%) and 98 men (39.8%).
- ***Nationality*** – the respondents subjectively declared their nationality. In this research three nationalities were represented – Vietnamese, Ukrainian and Mongolian. From the total number of 246 respondents (100%) 69 respondents (28.1 %) come from Vietnam, 93 respondents (37.8%) from Ukraine and 84 (34.1%) from Mongolia.
- ***Respondent age*** – from the total number of 246 respondents (100%) was 159 in the age group of 19 to 39 (64.4%), 77 respondents in the age group of 40 to 55 (31.3%) and 10 respondents in the age group of 56 to 65 (4.1%).

Influencable risk factors of CVD:

- ***Obesity***
  In terms of the questionnaire research the respondents answered one question concerning their weight and height. From these data BMI (Body Mass Index) was evaluated. Based on this evaluation of respondent weight according to BMI morbidity risk was determined (Table 1).
  Cardiovascular risk is especially high in the abdominal type of obesity. The respondents answered the question about the size of their waistline. Morbidity risk in connection to the waistline was subsequently evaluated (Table 2).

Table 1. Classification of excess weight and obesity according to BMI in connection to the risk of some diseases

Category	BMI (kg/m^2)	Risk of disease
Underweight	<18.5	Low (though elevated risk of other clinical problems)
Norm	18.5–24.9	Average
Overweight	25.0–29.9	Slightly increased
Obesity 1. degree	30.0–34.9	Increased
Obesity 2. degree	35.0–39.9	High
Obesity 3. degree	>40.0	Very high

Source: Provazník et al. 2004

Table 2. Waistline and the connected risk of origin of certain diseases

Risk of disease	Waistline	
	Men	***Women***
Elevated	>94 cm	>80 cm
High	≥102 cm	≥88 cm

Source: Provazník et al. 2004

- ***Hypertension***
  In terms of the research respondents were ask about their awareness of current blood pressure level. Thereafter their systolic and diastolic BP was sorted into 5 categories (see Table 3). The evaluation was executed with the help of nutrition software "NUTRIFIA". The author of this program is doc. MUDr. Jindřich Fiala, CSc. working at Institute of Preventive Medicine, Medical Faculty of Masaryk University, Prague, Czech Republic.

Table 3. Evaluation of systolic and diastolic blood pressure (BP)

Evaluation of systolic BP		Evaluation of diastolic BP	
Category	***Value (mmHg)***	***Category***	***value (mmHg)***
Hypotension	<100 mmHg	Hypotension	<60 mmHg
Optimum pressure	≥100 to <120 mmHg	Optimum pressure	≥60 to <80 mmHg
Norm tension	≥120 to <130 mmHg	Norm tension	≥80 to <85 mmHg
Elevated BP	≥130 to <140 mmHg	Elevated BP	≥85 to <90 mmHg
Hypertension	≥140 mmHg	Hypertension	≥90 mmHg

Source: Nutrition software "NUTRIFIA"

- ***Smoking (consumption of tobacco products)***
  Active smoking – respondents had the choice to answer the question about their smoking habits as – no, occasionally (less than 1 cigarette a day), regularly – where they were meant to give the information on the number of smoked cigarettes per day. Regular smokers were, based on the number of cigarettes smoked, divided into three categories to light (1–9 cigarettes a day), medium (10–19 cigarettes a day) and heavy smokers (20 and more cigarettes a day). The division of smokers into categories was achieved with the help of the nutrition software "NUTRIFIA".
  Passive smoking – respondent answered the question about the time spent in smoky environment (among possible answers was: not at all, rarely and often). The subjectivity of the evaluation of this question (and the possible answers) is obvious (the difference in the perception of words such as rarely and often is highly subjective), the results are thus not possible to quantify and are therefore in this context informative only.

Chosen aspects of social situation:

- ***Education***
  For education the categories chosen were following: unfinished basic education, finished basic education, skilled worker, high school with graduation, university degree. These answers were consequently re-categorised into four categories: basic education (finished and unfinished), skilled worker, high school with graduation, university degree, also considering the fact mentioned by Vacková (2010) that high school graduation is a land-mark of sorts enabling much wider possibilities on the job market.
- ***Occupation category***
  The original 13 categories (1. lawmakers, executive and management positions; 2. scientific and expert intellectual positions; 3. technical and healthcare and educational positions; 4. lower administrative positions; 5. service positions in services and businesses; 6. skilled workers in agriculture and forestry; 7. skilled workers, qualified manufacturers, manual workers and repairmen; 8. machine and equipment service workers; 9. assistants and unskilled workers; 10. unemployed; 11. women on maternity leave; 12. students; 13. others) were divided into 4 categories according to Matthews and Power (2002) – i.e. into: 1. Lower administrative positions, assistants in services and businesses (so called III. other skilled non-manual); 2. skilled workers, manufacturers, repairmen, machine and equipment services (so called III. skilled manual); 3. assisstant and unskilled workers (so called IV a V semi and unskilled manual); 4. outside job market (unemployed, women on maternity leave, students, others). The first category (so called scientific and expert intellectual positions, technical, healthcare and educational positions – I and II professional and managerial) was omitted as only one respondent corresponded to this category.

In terms of the questionnaire research the respondents were asked questions concerning their family and personal health situation. Due to low number of chronic illnesses in

the respondents, statistical testing on the occurrence of chosen illnesses and social determinants was not conducted.

Statistical data analysis

For statistical analysis of data described below, the Pearson chi square and Mann-Whitney tests were chosen. The level of significance α varies between 0.01 and 0.10. The level of significance is presented for all the conducted tests.

Target group – choice and number of respondents

Due to difficulties to contact some of the minority groups for the non-profit organisation workers in the regions of South Bohemia and Vysočina, the three nationalities chosen for this were Ukrainians, Vietnamese and Mongolians granted a permission to long-term stay in CR. The age of respondents varied between 18 to 65 years.

Choice of the respondents and data collection was carried out by three non-profit organisations – Migration centre – Archdeacon charity in Prague led by Mgr. Světlana Porche; Multicultural centre in České Budějovice – Greek Orthodox charity led by Mgr. Ruslana Zassiedko; Centre of multicultural education in Jihlava led by Mgr. Jana Horská, PhD. The choice of regions, non-profit organisations and nationality groups were given by the project aim. Respondents were not chosen statistically and were instead based on the research aims.

Collection of data from 100 respondents was originally assigned for the project, but in the actual research 246 respondents were successfully approached. The reason for this increase was the planned use of statistical methods, although it must be mentioned that the respondent sample was not representative and the conclusions cannot be used generally for the whole population of the chosen nationalities in the Czech Republic.

RESULTS

Chosen risk factors of CVD

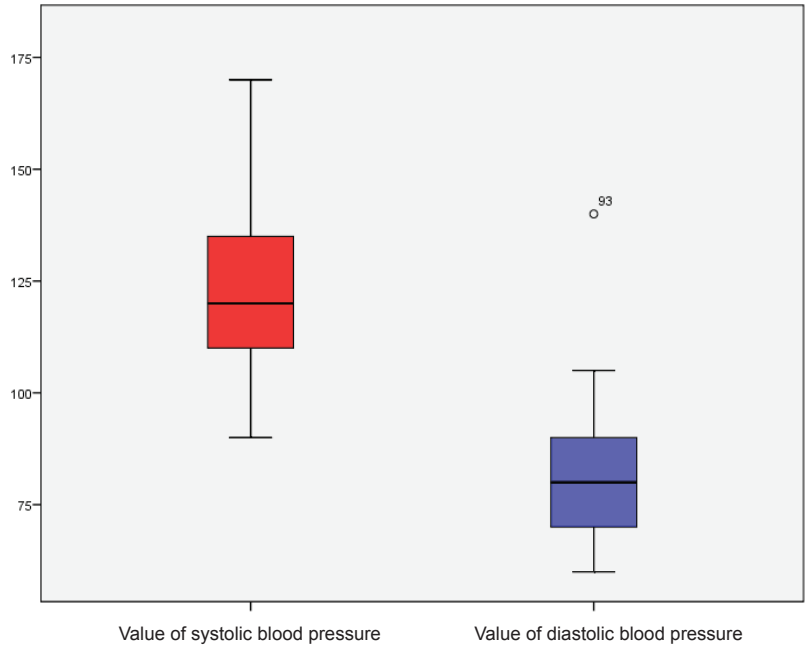
From the total number of 246 respondents (100%) 70 claimed to be light smokers (1–9 cigarettes a day) 28.5%, 14 medium heavy smokers (10–19 cigarettes a day) 5.6% and 9 respondents or 3.7% said to be heavy smokers (20 and more cigarettes a day), 132 respondents were non-smokers (53.7%). 21 respondents did not answer this question (8.5%).

Based on the BMI evaluation the data from the total number of 246 respondents (100%) shown 21 respondents or 8.5% running low to medium morbidity risk (BMI<18.5. underweight) and 124 respondents (50.4%) in low morbidity risk (BMI 18.5–24.9, normal weight). Slightly elevated morbidity risk was concluded for 57 respondents (23.2%), (BMI 25.0–29.9, overweight), 15 respondents or 6.1% (BMI 30.0–34.0 obesity of 1. degree) exhibit medium elevated risk and finally highly elevated risk (35.0–39.9, obesity of 2. degree) was found in 2 respondents (0.8%). 27 respondents did not respond to this question (11%).

Based on the waistline measurements on the total number of 246 respondents, 108 respondents (43.9%) were shown to run normal risk of CVD (<80 cm women, <94 men), elevated risk was found for 27 respondents or 11% (80–88 cm women, 94–102 cm men) and 7 respondents (2.8%) were shown to run a high risk of CVD (>88 cm women, >102 men). 104 respondents were not evaluated.

Box plot in Graph 1 gives basic information on the distribution of variables (evaluation of respondent blood pressure BP) and graphically shows the median, quarterlies and data extremes.

From the total number of 83 respondents for whom the blood pressure has been measured, the average value of systolic pressure was estimated to 125 mmHg while the average of diastolic pressure was 79,2 mmHg. These values correspond to the normal systolic pressure (≥120 to <130 mmHg) and optimal diastolic pressure (≥60 to <80 mmHg) (Brabcová 2012b).



Source: COST research, reg. nr. OC 10031 named: "Health and social situation of immigrants and asylum seakers in Czech Republic"

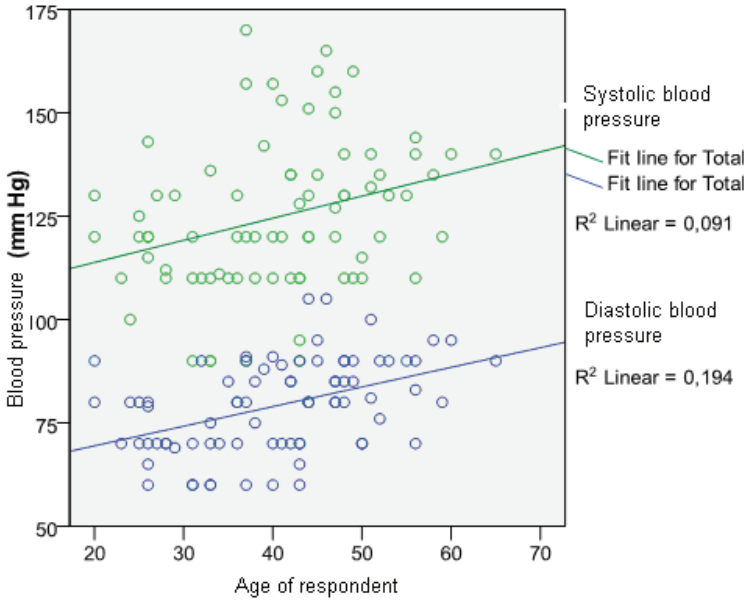
Graph 1. Evaluation of respondent blood pressure (Box plot)

The lowest found systolic pressure measured 90 mmHg (hypotension <100 mmHg), the highest 170 mmHg (hypertension ≥140 mmHg and more). The lowest diastolic pressure was measured to 60 mmHg (optimum ≥60 to <80 mmHg) and the highest to 105 mmHg (hypertension, ≥90 mmHg and higher). Medium value (median) of the systolic pressure was calculated to 120 mmHg (normal ≥120 to <130 mmHg) and 80 mmHg of the diastolic (normal ≥80 to <85 mmHg).

Point Graph 2 showing the dependence of systolic and diastolic blood pressure on age. The reached level of significance of the variance analysis of regression model was in both cases below 0.05 ($p = 0.005$ for systolic and $p<0.001$ for diastolic pressure). Blood pressure is therefore concluded to be statistically significantly dependent on and shown to increase with age.

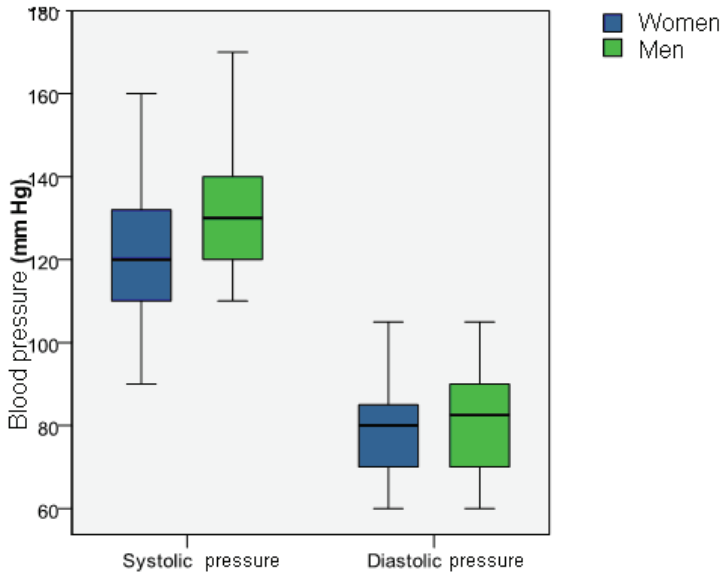
The average systolic pressure in women was 122 mmHg, 132 mmHg in men, while the average diastolic pressure in women was 78 mmHg and 82 mmHg in men. The results of the Mann-Whitney test showed statistically significant difference in the systolic pressure between men and women ($p = 0.043$; 4.3%). The sexes ($p = 0.130$; 13%) (Graph 3).

Point Graph 4 showing the dependence of systolic and diastolic blood pressure on the BMI value. The reached level of significance of the variance analysis of regression model was in both cases below 0.05 ($p<0.001$ for both systolic and diastolic pressures). Blood pressure is therefore concluded to be statistically very significantly dependent on and shown to increase with the BMI value.



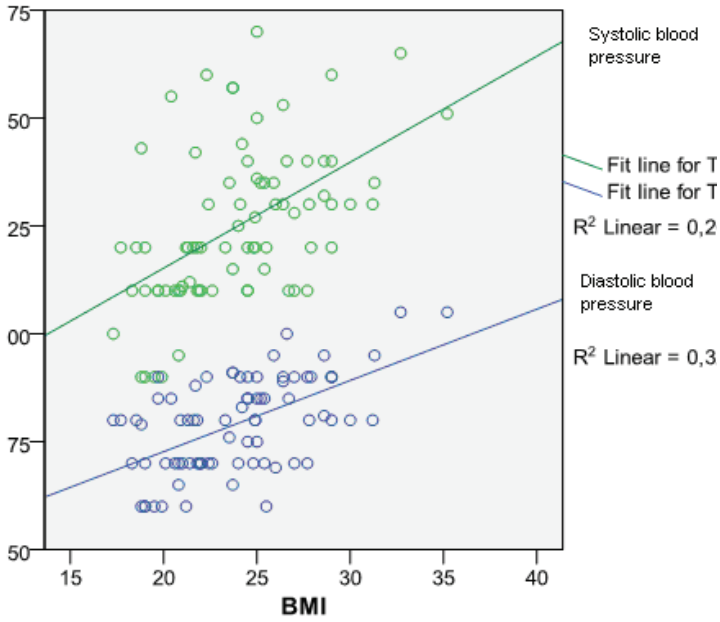
Source: COST research, reg. nr. OC 10031 named: "Health and social situation of immigrants and asylum seakers in Czech Republic"

Graph 2. Systolic and diastolic blood pressure dependence on age



Source: COST research, reg. nr. OC 10031 named: "Health and social situation of immigrants and asylum seakers in Czech Republic"

Graph 3. Systolic and diastolic blood pressure dependence on gender



Source: COST research, reg. nr. OC 10031 named: "Health and social situation of immigrants and asylum seakers in Czech Republic"

Graph 4. Systolic and diastolic blood pressure dependence on BMI values

Statistically tested connections between social variables and CVD risks

Smoking and time spent in smoky environment versus social determinants of health (gender, age, generational classification)

Research conducted by Geronimus et al. (1993) or Hassmiller et al. (2003) suggests that minorities and women may have different smoking patterns than do European and American smokers and men. This fact was inferred by this research, where the results show that smoking is statistically significantly dependent on the respondent gender ($p = 0.000$), their generational classification (0.000) and their nationality ($p = 0.001$) on the significance level of $\alpha = 0.05$.

Comparison of the relative answer frequency from the respondents shows a trend that the tobacco product consumption differs with respondent gender. The centre of gravity in answers from women was predominantly in the non-smoker (66.4%) and light smoker (29.2%) categories. For men the answer distribution was broader and suggested that 46.6% men are non-smokers, 34.1% are light smokers and 19.3% men are medium heavy and heavy smokers.

The largest non-smoking group was found in the Ukrainian minority (75.0%). Vietnamese minority exhibited the largest group of light smokers (45.9%), while the largest group of medium and heavy smokers was found among the Mongolian respondents (11.7%). The largest group of non-smokers was found among the middle aged and elderly generation (67.3%), while he largest group of light smokers was among the young generation (47.9%).

Chosen characteristics smoking versus education and occupation category

According to Barbeau et al. (2004), smoking is more frequent in people with the lowest educational levels, the least amount of income, the highest levels of poverty, and the lowest occupational status, who belong in fact among the poorest population strata.

In our research statistically significant connection on the significance level (α = 0.10) was found between the stay in smoky environment and education (p = 0.059) and between the stay in smoky environment and occupation category (α = 0.05, p = 0.012). Statistically significant connection on the significant level α = 0.05 on respondents smoking (and frequency thereof) with their achieved education (p = 0.997, p = 0.884) or occupational class (p = 0.343, p = 0.372) was not found. This result can be caused by the low number of respondents included into the research or the non-representative (and non-stratified) choice.

The number of respondents that spend time in smoky environments increases from non-manually working (lower administrative, technical, healthcare, educational and other non-manual occupations) to manually working (unskilled working professions). The same fact applies on a smaller scale for education– where the number of respondents that spend time in smoky environment increases from achieved basic to university education (Brabcová 2012a).

Evaluation of morbidity risk according to BMI versus respondent gender

Based on the significance level of α = 0.05 statistically significant connection was shown between morbidity risk based on MBI and gender of respondents (p = 0.014), generational classification (p = 0.000) and nationality (p = 0.000).

Comparing the relative frequency of answers shows that women run lower risk of morbidity BMI then men. According to the generational classification, an increasing trend following the age of respondents can be shown. The Ukrainian minority exhibited higher risk of morbidity according to BMI (47.9% at high risk) as compared to the Asian minority groups (Mongolians and Vietnamese) (Brabcová 2012b).

DISCUSSION

Smoking has long been identifies as one of the major behavioural determinants of weak health, disability and early death (USDHHS 2004). During smoking, according to Provazník et al. (2004), nicotine and carbon dioxide are inhaled into the organism, where both these substances encourage the onset of diseases such as ICHL and IHD and roughly half of deaths caused by cardiovascular diseases especially coronary incidents are caused by smoking. Danzinger and Gottschalk (1995) and Massey (1996) state that the imbalance in smoking between men, women or different racial or ethnic subpopulations is connected to economic and social changes that also influence the labour market. Our results confirm some of the above mentioned claims. From the total number of 246 respondents (100%) 28.5% were light smokers (1–9 cigarettes a day), 5.7% were medium smokers (10–19 cigarettes a day) and 3.7% heavy smokers (20 and more cigarettes a day). 53.7% respondents were non-smokers. Statistically significant dependence between consumption of tobacco products and gender of the respondent (p = 0.000) was also inferred by statistical analysis. For women the results were predominately in non-smoker (66.4%) and light smoker (29.2%) categories. For men the dispersion of answers was broader with 46.6% non-smokers, 34.1% light smokers and 19.3 % men as medium and heavy smokers (Brabcová, 2012a).

On the significance level of α = 0.05 the consumption of tobacco products was shown to be statistically dependent on the generational classification of the respondents (p = 0.000). The largest group of non-smokers belonged to the middle aged and elderly generation (67.3%), while the largest group of light smokers was comprised of the young generation (47.9%).

The consumption of tobacco products by respondents was statistically significantly changing with nationality of respondents (0.001). The largest group of non-smokers belonged to the Ukrainian minority group (75.0%), while the Vietnamese minority held the largest group of light smokers (45.9%). According to WHO statistics of 2010 50% men and 11.3% women in the age category of 15+ in Ukraine, 48% men and 6% women in Mongolia and 47% men and 1.4% women in Vietnam were smokers (Report on the Global Tabacco Epidemic, 2011, Country profile Ukraine, Viet Nam, Mongolia 2011). This research showed higher percentage of smokers in Mongolian and Vietnamese but not Ukrainian minorities, the reasons probably based on the negative

influence of acculturation process when the minority takes on specific features of the majority (Chakraborty and Chakraborty 2010). Compared to Mongolia and Vietnam the Czech Republic shows statistics of high usage of tobacco products, especially in women, where in 2010 43% men and 32% women in the age category of 15+ were smokers (Report on the Global Tabacco Epidemic, 2011, Country profile Czech Republic 2011).

According to Barbeau et al. (2004) smokers are more often found in individuals with lowest achieved levels of education, economics and/or employment categories – in fact belonging to the lowest social class. Statistically significant connection was also shown for the time spent in smoky environment in relation to education and occupational category, where the number of respondents spending time in smoky environment increases from non-manual (lower administrative, technical, healthcare, educational and other non-manual occupations) to manual workers (unskilled worker professions). The same applies for education, where the number of respondents that spend time in smoky environment increases from achieved university to basic education. The reasons why the connection between the consumption of tobacco products and education or occupational category has not been confirmed can be due to the low numbered and non-representative research sample.

"Arterial hypertension is an illness characterised by elevated arterial blood pressure in the greater blood circulation system" (Vokurka et al. 2004, p. 357). The risk of the onset of cardiovascular diseases increases with elevation of the systolic and diastolic blood pressures. According to the nutritional program NUTRIFIA the normal blood pressure values should keep within 120/80 mmHg, with the border values on 139/89 mmHg. Blood pressures above 140/90 mmHg is considered as hypertension. According to Provazník et al. (2004) high blood pressure does initially exhibit no clear signs. However, untreated hypertension can lead to later complications, such as heart failure, acceleration of atherosclerosis, onset of cardiovascular diseases or kidney dysfunction. Scientific research studies show that correctly treated hypertension brings significantly lower health risks than the normally implicated ones.

Framingham study shows (Zaret and Moser 1992) that lowered body weight by 15% is followed by a decrease of the systolic blood pressure by about 10%. From the total number of 83 respondents for whom the blood pressure was evaluated, the average value for systolic pressure was 125 mmHg and 79 mmHg for diastolic pressure which corresponds to normal systolic (≥120 to <130 mmHg) and optimum diastolic pressure (≥ 60 to <80 mmHg). Based on the median values, the middle value comes 120 mmHg for systolic (normal, ≥120 to <130 mmHg) and 80 mmHg for diastolic pressure (normal, ≥80 to <85 mmHg) – see Graph 1.

The blood pressure is growing (according to Wright et al. 2011) with age independent on gender, race or ethnicity. The risk of hypertension is highest in men aged 35–55 and in women past menopause (Stibich 2007). The research also showed growing systolic and diastolic blood pressures with age of the respondents (Graph 2). Men exhibited higher values of both pressures compared to women (Graph 3). Higher weight and obesity is a significant risk factor of hypertension and dependence on blood pressure and value of BMI was also confirmed in this research (Graph 4). Further recognised risk factors of high blood pressure are pregnancy, anti-conception pills, smoking, insufficient physical activity, family burden as well as high consumption of salt and fats. Hypertension belongs according to Binh et al. (2011) among the ten most frequent illnesses of the Vietnamese population. For further research it would be suitable to map the blood pressure in immigrants in dependence to their nationality or acculturation process, the later being according to Chakraborty and Chakraborty (2010) a risk in itself. In this study, male immigrants in low and high degree of acculturation showed lower risk for hypertension than those in the middle of the acculturation process.

According to Hubert et al. (1983) obesity has, as assessed by BMI, been identified as a risk factor for many diseases including cardiovascular. Overeating can result in an increased body mass, overweight and obesity. From indicators used for evaluation of overweight and obesity determination of BMI was used in this study. Values of BMI of 25 and higher indicate an increased risk of morbidity

and mortality. From the total number of 246 respondents (100%) was according to BMI 8.5% respondents in low to elevated morbidity risk (BMI <18.5, underweight), 50.4% respondents found themselves in low morbidity risk (BMI 18.5–24.9, normal weight) 23.2% respondents exhibited slightly elevated morbidity risk (BMI 25.0–29.9, overweight) 6.1% respondents elevated (BMI 30.0–34, obesity of 1. degree) and 0.8% respondents were shown to exhibit highly elevated morbidity risk (35.0–39.9, obesity of 2. degree). By statistical testing statistically significant connection was found for the evaluation of morbidity risk assessed by BMI and gender (p = 0.014), age (p = 0.000) and nationality of the respondents (p = 0.000) (Brabcová 2012b).

Based on the waistline measurements 43.9% respondents from the total number of 246 run normal risk of CVD (<80 cm women, <94 men), 11% respondents higher risk (80–88 cm women, 94–102 cm men) and 2.8% of the respondents have a high risk of CVD (>88 cm women, >102 men).

CONCLUSION

The aim of this research was to map chosen risk factors of cardiovascular diseases (consumption of tobacco products, blood pressure and obesity) for a research group of immigrants. Next step was to evaluate the morbidity risk according to MBI, and statistically analyse the connection between chosen indicators of social situation (gender, age, nationality) and morbidity risk in the respondents.

Based on the established aims following conclusions can be made:

- The largest group of respondents (53.7%) were non-smokers and 28.5% light smokers (1–9 cigarettes day).
- For roughly half of the respondents (50.4%) the morbidity risk according to BMI was evaluated as low, and for 23.2% as elevated risk.
- The evaluation of risk for cardiovascular diseases based on the waistline showed 43.9% respondents in normal risk zone and 11% in elevated risk zone.
- Median value of the systolic blood pressure of respondents was measured to 120 mmHg (normal, ≥120 to <130 mmHg) while the diastolic blood pressure median was evaluated to 80 mmHg (normal, ≥80 to <85 mmHg).
- On the significance level of $\alpha = 0.05$ statistically significant connection was shown for respondent smoking habits and their gender ($p = 0.000$), age ($p = 0.000$) and nationality (0.001). On the significance level of $\alpha = 0.01$ statistically significant connection was shown for respondent education and occupation ($p = 0.059$).
- On the significance level of $\alpha = 0.05$ statistically significant connection was shown for respondent morbidity risk according to BMI evaluation and gender ($p = 0.014$), age ($p = 0.000$) and nationality ($p = 0.000$).

It is clear that the major limitations of this research study are the insufficient representativeness and stratification of the research group. On the other hand, some of the results confirm important facts, that would be suitable for further investigation on a more representative sample (research aim and financial support has made this impossible). Among further interpretation difficulties belong also the way the blood pressure values were obtained (from own knowledge of respondents), that might not have been accurate at the time of the research and might not correspond to the other facts found. Authors are also aware of further limitations stemming from the concept of social determinants of health, such as for instance the drift hypothesis, that is in opposition to the theory of the social causation thesis as is mentioned by Manning et al. (1989), Dooley et al. (1992), Leigh (1995), Ellaway and Macintyre (2007) and Hurst (2007) and that complicates the specification of connection between the position on the labour market outcomes and the health-related behaviours. Further evidence for a potential reverse causal relationship may also be inferred from the studies that link smoking to work disability and thereby premature exit from the labour force studied by Lund et al. (2001) or Lund and Csonka (2003).

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