

# Evaluation of medical workers according to the risk factors for developing cognitive impairment

## Medicinos darbuotojų vertinimas pagal rizikos veiksnius kognityvinių funkcijų sutrikimui išsivystyti

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### SUMMARY

**Background.** With the increasing of the life expectancy, the average age of practising medical workers in Lithuania has reached 49 years, and still the tendency towards life expectancy is continuing to increase. Therefore, cognitively healthy aging has been prioritised in Lithuania.

**Objective.** To evaluate the incidence of preventive and risk factors for developing cognitive impairment/ dementia among medical workers in Lithuania, and to predict this risk over a 20- year period.

**Materials and methods:** In total, 138 medical workers aged 50 years and older (89.9% were females) at three different medical institutions in Lithuania, participated in the cross-sectional study and filled in a questionnaire developed by authors (Bagdonaite E., Steibliene V.). The questionnaire included information about six risk factors that increase and four preventive factors that decrease the risk of developing cognitive impairment/dementia. The risk for developing cognitive impairment/dementia in 20 years was calculated using the Cardiovascular Risk Factors, Aging and Dementia (CAIDE) risk score.

**Results.** The one third of subjects (31.2%) had two risk-increasing factors. No more than two risk-increasing factors had 61.3% and no more than three – 79.1% of all subjects. The most frequent risk factor was arterial hypertension (37.0%), the rarest – type 2 diabetes mellitus (5.1%). All subjects had one preventive factor – education and the majority (42.0%) had two additional preventive factors. The most frequent preventive factor was cognitive activity (70.0%), the rarest – adherence to the Mediterranean diet (25.0%). The most frequent factor that determined high CAIDE risk scores was the absence of regular physical activity. The risk of 1% for developing cognitive impairment/dementia in 20 years was estimated for 61.6%, 1.9% risk for 34.1% and 4.2% risk for 4.3% medical workers.

**Conclusions.** Three-quarters of medical workers in Lithuania had no more than 3 risk-increasing factors for developing cognitive impairment/dementia, of which inheritance among the first line relatives was the most frequent. The majority of medical workers had 2 cognitive impairment/dementia risk-decreasing factors – long duration of education and intensive cognitive activity in free time. The risk of developing cognitive impairment/dementia in 20 years of lifetime among medical workers in Lithuania did not exceed 4.2%, however, this risk could be diminished by an increase in physical activity and adherence to the Mediterranean diet.

**Key words:** cognitive impairment, dementia, risk, medical workers, CAIDE

### SANTRAUKA

**Įvadas.** Ilgėjant tikėtinai gyvenimo trukmei, vidutinis praktikuojančių medicinos darbuotojų amžiaus vidurkis Lietuvoje pasiekė 49 metus, bei stebima tendencija didėti. Todėl sveikas kognityvinis senėjimas tampa prioritetine tyrimų sritimi.

**Tyrimo tikslas.** Įvertinti kognityvinio sutrikimo/demencijos išsivystymo riziką didinančių ir mažinančių veiksnių dažnius tarp Lietuvos medicinos darbuotojų Lietuvoje bei nustatyti išsivystymo riziką per ateinančius 20 gyvenimo metų.

**Metodai.** Trijų Lietuvos gydymo įstaigų 138 medicinos darbuotojai, 50 metų amžiaus ir vyresni (89,9 proc. tiriamųjų – moterys), dalyvavo skersinio pjūvio dizaino tyrime ir užpildė autorių sudarytą klausimyną, kuriame vertinti šeši kognityvinio sutrikimo/demencijos išsivystymo riziką didinantys ir keturi riziką mažinantys veiksniai. Rizikos kognityviniam sutrikimui/demencijai išsivystyti per ateinančius 20 gyvenimo metų nustatymui naudota Kardiovaskulinių rizikos veiksnių, Senėjimo ir Demencijos (angl. *Cardiovascular Risk Factors, Aging and Dementia, CAIDE*) skalė.

**Rezultatai.** Viena trečioji tiriamųjų dalis (31,2 proc.) turėjo du riziką didinančius veiksnius. Ne daugiau dviejų riziką didinančių veiksnių turėjo 61,3 proc., ne daugiau trijų – 79,1 proc. tiriamųjų. Dažniausiai pasitaikantis rizikos veiksnys buvo arterinė hipertenzija (37,0 proc.), rečiausiai – II tipo cukrinis diabetas (5,1 proc.). Visi tiriamieji turėjo vieną riziką mažinantį veiksnių (išsilavinimo trukmę), bet beveik pusė tiriamųjų (42,0 proc.) taip pat turėjo du papildomus riziką mažinančius veiksnius. Dažniausiai nustatytas riziką mažinantis veiksnys buvo užsiėmimas kognityvine veikla (70,0 proc.), rečiausiai – mityba pagal Viduržemio jūros dietą (25,0 proc.). Dažniausiai pasitaikantis CAIDE balą didinantis rizikos veiksnys – reguliaraus fizinio aktyvumo nebuvimas. Demencijos išsivystymo rizika per 20 metų lygi 1 proc. buvo nustatyta 61,6 proc., 1,9 proc. rizika – 34,1 proc., 4,2 proc. rizika – 4,3 proc. tiriamųjų.

**Išvados.** Trys ketvirtadaliai Lietuvos medicinos darbuotojų turi ne daugiau trijų kognityvinio sutrikimo/demencijos riziką didinančių veiksnių, iš kurių dažniausias yra pirmos kartos paveldėjimas demencijos sutrikimui. Dauguma medicinos darbuotojų turi du riziką mažinančius veiksnius: ilgą išsilavinimo trukmę bei užsiėmimą intensyvia kognityvine veikla ne darbo metu. Lietuvos medicinos darbuotojų rizika kognityviniam sutrikimui/demencijai išsivystyti per ateinančius 20 gyvenimo metų yra ne didesnė nei 4,2%, bet koreguojant mažą fizinį aktyvumą ir laikantis Viduržemio jūros dietos principų, šią riziką būtų galima dar sumažinti.

**Raktažodžiai:** kognityvinių funkcijų sutrikimas, demencija, rizika, medicinos darbuotojai, CAIDE

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## INTRODUCTION

According to the data of the World Health Organization (WHO), 47.5 million of world population were suffering from with dementia in 2016 [1]. The number of dementia cases in Lithuania was slightly higher than 47 thousand [2]. With the increasing of the life expectancy and the decreasing the rate of birth in most developed countries, the elderly people make a significant proportion of total population [3]. Therefore, a rise in prevalence of chronic diseases (including dementia) is expected. It is predicted that number of dementia patients will have exceeded 130 million in 2050 [4]. While dementia decreases life expectancy by 8.5 years on average, the biggest impact is laid on quality of life of patients themselves and their relatives, as well causing large economic burden to the society [5]. Alzheimer's disease (AD) is the most frequent type of dementia in the world, constituting around 60.0-80.0% of total diagnosed dementia cases. Vascular dementia (VD) comprises approximately 10.0% of dementias [6], however this type of dementia is most often diagnosed in Lithuania [7]. Other types of dementia (dementia with Lewy bodies, frontotemporal dementia, mixed dementia, dementia in Parkinson's disease, Creutzfeldt-Jakob disease and etc.) constitute significantly lower part. Clinical-pathological studies show that mixed pathologies occur more often than various types of dementia separately, i.e. AD and VD, AD and dementia with Lewy bodies [8]. In addition to timely and effective pharmaceutical treatment, the prevention of dementia remains the main factor in reduction of dementia morbidity [9]. In perfect scenario, primary dementia prevention means postponing the onset of the disease [10]. Therefore, the most recent identification of the number of possibly modifiable and unmodifiable risk factors, associated with developing of dementia, could postpone the onset of the cognitive impairment. It was estimated that postponing the onset of dementia by 5 years on average, dementia morbidity could be decreased by 50.0% in total population [11].

More focus has recently been put on the health of medical workers. A number of studies [12, 13, 14] have been performed to evaluate the use of psychoactive substances, stress in working environment and mental health of medical workers. However, little is known about prevalence of various preventable factors within medical community.

There are no studies about physical and mental health of medical workers in Lithuania. But the average age of practising medical workers in Lithuania in the recent years has reached 49 years with the trend to increase [15]. Due to the expanded requirements and expectations for medical competence and experience, this professional group should be aware of cognitively healthy aging. Thus the aim of our study was to estimate the risk of developing cognitive impairment/dementia among medical workers in Lithuania, as well as to assess the prevalence of factors possibly increasing and decreasing this risk.

## MATERIALS AND METHODS

This study was approved by the Centre of Bioethics of the Lithuanian University of Health Sciences and its consent procedures on the 15th of January, 2016 (permission number: BEC-MF-199).

## Study population

This cross-sectional study was conducted at three different medical institutions: one university hospital – Lithuanian University of Health Sciences Hospital Kaunas Clinics, one regional hospital – Kedainiai Hospital and one Primary Health Care Centre – in Kedainiai town. The inclusion criteria for the study were: medical worker – a doctor or a nurse; the consent to participate in the study and signed informed consent form; age – 50-years and older; no previous diagnosis of cognitive impairment.

In total, 200 medical workers were invited to participate in this study. At first, 30 questionnaires for pilot study were distributed. Validity of questionnaire was evaluated using Cronbach  $\alpha$  criteria, equal 0.609. After that, the additional 170 questionnaires were distributed. One hundred and thirty eight questionnaires were returned and were suitable for final analysis (response rate – 69.0%).

## Methods

An original questionnaire, based on literature review and selection of factors, increasing and decreasing the risk of cognitive impairment/dementia and items of the Cardiovascular Risk Factors, Aging and Dementia (CAIDE) scale was developed by the authors [16]. The questionnaire included information about sociodemographics (gender, age, education), height, weight, physical health (diabetes, arterial hypertension, etc), lifestyle factors (nutrition, smoking and alcohol consumption), cognitive and physical activity. During the data analysis, the risk factors were divided into two groups: six factors increasing the risk of developing cognitive impairment/dementia and four factors decreasing this risk.

Factors considered to increase the risk were: (1) obesity (body mass index (BMI) 30 kg/m<sup>2</sup> and higher [17, 18]; (2) arterial hypertension (AH), systolic blood pressure >140 mmHg [19, 20]; (3) type 2 diabetes (T2DM) [21, 22]; (4) currently active smoking (calculating smoking packs per years, according to the formula – (daily cigarette intake / 20) x duration of smoking in years) [23]; (5.1) problematic alcohol consumption, evaluated by as 14 and more standard units of alcohol (SUA) weekly [24, 25] and (5.2) alcohol non-users [26]; (6) family history of cognitive impairment within the first or the second-degree relatives [27].

Factors considered to decrease the risk were: (1) education lasted for 10 years or longer [24, 28]; (2) intensive cognitive activity: regular performing of 6 and more cognitive activities, 13 possibilities presented in the questionnaire (walking for pleasure or excursion, visiting friends or relatives, being visited by relatives or friends, physical conditioning, doing unpaid community volunteer work and etc) in the past year [29]; (3) regular physical activity in the past year [30, 31, 32]; (4) adherence to the Mediterranean diet, rated on “MedDiet” questionnaire score 7 or more [33, 34].

The estimated 20-year risk for medical workers to develop cognitive impairment/dementia was evaluated using the CAIDE scale, developed in the Cardiovascular Risk Factors, Aging and Dementia (CAIDE) study [35]. The CAIDE scale is a validated tool for estimating 20-year dementia risk in the general population based on a midlife risk profile. Factors considered to increase and to decrease the risk of cognitive

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impairment were evaluated according to the known odds ratios and the score (points) of each CAIDE item was calculated [24]. Future dementia most significantly is predicted by age (47–3 years – 3 points,  $\geq 53$  years – 4 points), education (7–9 years – 2 points,  $< 6$  years – 3 points), arterial hypertension (systolic blood pressure  $\geq 140$  mmHg – 2 points), obesity (body mass index  $\geq 30$  kg/m<sup>2</sup> – 2 points), low physical activity in the past year period (1 point), etc. The CAIDE total score is the sum of scores of all items (range 0–13). The CAIDE scale total score 0–5 shows the estimated 1.0% risk of dementia [95% CI 0.0–2.0]; a score 6–7 shows the risk of 1.9% [95% CI 0.2–3.5]; a score of 8–9 shows the risk of 4.2% [95% CI 1.9–6.4]; a score of 10–11 shows the risk of 7.4% [95% CI 4.1–10.6] and a score of 12–13 shows the risk of 16.4% [95% CI 9.7–23.1].

### Statistical analysis

Sample size (n=172) was defined using Paniotto method, and was based on the number of 50 years and older of medical workers (n=300) selected for this study and working in medical institutions. Data was analysed using Microsoft Office Excel 2007 and IBM SPSS Statistics 22.0 software. Statistical analysis included descriptive statistics, Cramér's V correlation coefficient, Chi-Square test of variable independence. Correlation coefficient and p value are given in results. Statistical significance was assumed at  $p \leq 0.05$ .

### RESULTS

In total, 89.9% (n=124) of study participants were females. Average age was 57.5 years (standard deviation (SD) 5.43); minimum age was 50, maximum – 80 years.

The distribution of the factors increasing the risk of developing cognitive impairment/dementia among medical workers is presented in Table 1. The lowest value of BMI in the sample was 17.5 kg/m<sup>2</sup>, the highest – 34.6 kg/m<sup>2</sup>. Based on BMI value, 8.7% of subjects were obese and were classified as a higher risk group. The vast majority did not indicate that they suffered from AH and T2DM. Thus, 37.0% of subjects with AH and 5.1% of subjects with T2DM were allocated to the higher risk group.

Only 10.1% of study subjects were active smokers and were allocated to the higher risk group. Based on evaluation by pack-years of smoking, all active smokers smoked up to 25 pack-years. In this sample, average number of pack-years of smoking was 9.3 (SD=7.75). Additionally 12.3% were reported as ex-smokers, but that was not considered as a risk-increasing factor.

Among those who reported using alcohol, most frequent intake was once in a week (88.5%), none of the subjects indicated using alcohol more than three times per week. Most frequently, 13% of alcohol by volume (ABV) was used with 100 ml daily intake. Total average daily alcohol volume intake was 204.1 ml (SD=237.40). Among those, who reported consuming alcohol, none was allocated to the higher risk group, because none reported using 14 or more SUAs per week (not problematic alcohol users). Otherwise, according to the data [26], not problematic alcohol use is associated with a lower risk for the development of dementia compared to alcohol non-users, therefore, more than a half (55.8%) of respondents in the study sample, who did not consume alcohol at all, were allocated to the higher risk group.

Table 1. The distribution of factors increasing the risk of developing cognitive impairment/ dementia among medical workers (n=138)

Risk factor		n (%)	
Body mass index, kg/m <sup>2</sup>	<25.0	66 (47.8)	
	25.0–29.9	60 (43.5)	
	$\geq 30.0$	12 (8.7)	
Arterial hypertension, systolic blood pressure mmHg	>140 mmHg	51 (37.0)	
	$\leq 140$ mmHg	87 (63.0)	
Type 2 diabetes	Yes	7 (5.1)	
	No	131 (94.9)	
Smoking	Yes, currently smoking	14 (10.1)	
	Yes, smoked previously and quit	17 (12.3)	
	No, never smoked	107 (77.5)	
Alcohol consumption	Yes	61 (44.2)	
	Days of weekly alcohol consumption	1	54 (88.5)
		2–3	7 (11.5)
		Alcohol by volume, %	5
		13	47 (77.0)
		40	7 (11.5)
	Alcohol volume intake, ml	100	40 (65.6)
		100–500	19 (31.1)
		>500	2 (3.2)
	Weekly SUA intake	<0	77 (55.8)
0–14		61 (44.2)	
$\geq 14$		0 (0)	
No		77 (55.8)	
Inheritance for dementia	1st degree relatives	Yes 48 (34.8)	
	2nd degree relatives	Yes 43 (31.2)	

SUA – standard unit of alcohol

More than one third of respondents were classified as the higher risk group according to family history of cognitive impairment in the first (34.2%) or the second-degree (31.2%) relatives.

The distribution of the sample according to the total number of risk-increasing factors is presented in Table 2. Only 8.7% of respondents in total sample did not have any factors increasing risk for cognitive impairment/ dementia; but also, only 1.4% – had all 6 risk factors. On average, subjects had 2.3 risk-increasing factors (SD=1.10). Among those subjects with at least one risk factor identified, 61.3% – had no more than 2 risk factors, and 79.1% – no more than 3 factors. The most frequent risk factor was AH – separately or together with any other risk factor it was identified for 51 subjects (37.0%). The rarest risk factor was found to be T2DM – 7 cases (5.1%).

The distribution of the factors decreasing the risk of developing cognitive impairment/dementia among study

**Table 2. The distribution of sample of medical workers according to the total number of risk-increasing factors**

Total number of risk factors	n (%)
0	12 (8.7)
1	36 (26.1)
2	43 (31.2)
3	33 (23.9)
4	10 (7.2)
5	2 (1.4)
6	2 (1.4)

**Table 3. The distribution of factors decreasing the risk of developing cognitive impairment/ dementia among medical workers (n=138)**

Risk factor	n (%)
Regular physical activity in past year period	Yes 57 (41.3) No 81 (58.7)
Cognitive activity, sum of regular cognitive activities	≥6 96 (69.9) <6 42 (30.4)
Education, years	≥10 138 (100) <10 0 (0)
Adherence to Mediterranean diet, „MedDiet“ score	≥7 34(26.6) <7 104 (75.4)

participants is presented in Table 3. All subjects were found to have the same risk-decreasing factor – longer than 10-year duration of education. The second most frequent risk-decreasing factor was intensive cognitive activity after work – 69.9% of subjects were allocated to this group. Only 41.3% of respondents reported physically exercising on a regular basis during the past year period and only 26.6% of subjects adhered to the Mediterranean diet, which was the rearest risk-decreasing factor of cognitive impairment/dementia.

The distribution of the sample according to the total number of the risk-decreasing factors is presented in Table 4. Duration of education was excluded from further frequency analysis of the risk-decreasing factors, because all subjects

**Table 4. The distribution of sample of Lithuanian medical workers according to the total number of risk-decreasing factors**

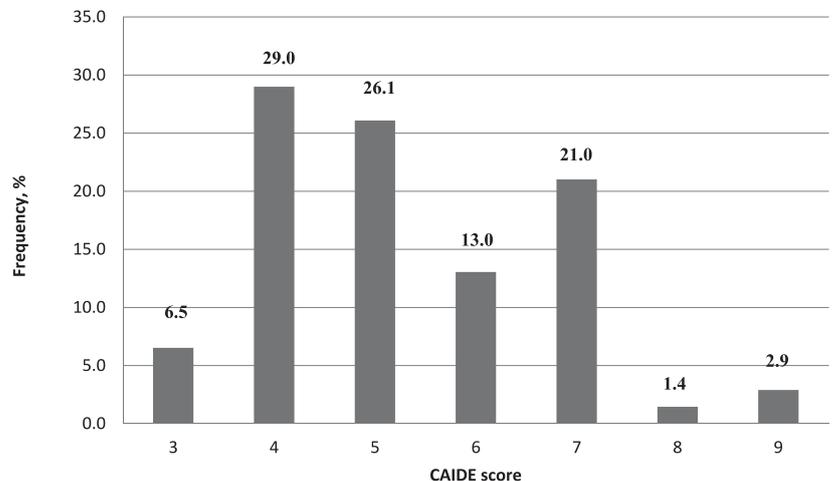
Total number of risk factors	n (%)
0	20 (14.5)
1	58 (42.0)
2	50 (36.2)
3	10 (7.2)

were allocated to this risk-decreasing group. Any of the remaining three risk-decreasing factors were not indicated by 14.5% of subjects. The minority of the sample had all three additional risk-decreasing factors (7.2%). The biggest part (42.0%) of the sample was detected with one additional risk-decreasing factor. On average, subjects had additional 1.6 risk-decreasing factors (SD=0.64). The most frequent additional risk-decreasing factor was cognitive activity (found in 70.0% of the sample, n=96), the least frequent – adherence to the Mediterranean diet (34 cases, 25.0%).

The evaluation of the risk for medical workers to develop dementia in upcoming 20 years, according to the CAIDE scale and the distribution of the CAIDE scores are presented in Figure 1. None of subjects received total CAIDE score below 3 points – it could be explained by the fact that subjects were evaluated no less than 3 or 4 points due to their age (50 years and older); according to BMI, 12 subjects were assessed by 2 points; for physical inactivity, 81 subjects received 1 point; the value of systolic blood pressure (SBP) ≥140mmHg granted 2 points for 51 subjects. Generally, more than a half of subjects (55.1%) received 4 and 5 total CAIDE scores. Average sample CAIDE score was 5.3 points (SD=1.43). Based on total scores, 1% risk of developing dementia in 20 years was determined for 85 subjects (61.6%), 1.9% risk – for 47 subjects (34.1%), and 4.2% risk – for 6 subjects (4.3%). None of the subjects was evaluated by 10 or more points of the CAIDE scale score, corresponding to 7.4% or higher risk of developing dementia.

Seeking to explore which risk factors contributed most to the total CAIDE scores, the frequency of higher CAIDE scores was evaluated for separate risk factors. The most frequent unmodifiable risk factor that contributed to higher total CAIDE score was age above 53 years; the most prevalent modifiable risk factor – absence of regular physical activity and non-adherence to the Mediterranean diet.

Evaluating the association between total CAIDE scores and scores of separate risk factors, it was found that the most frequent CAIDE scores by age were 5 (n=33) and 4 (n=30). Statistically significantly higher total CAIDE scores (Cramér’s V coefficient 0.601, p<0.001) were determined in 53-year-old and older subjects. The most frequent CAIDE scores by systolic blood pressure were also 4 and 5. Subjects with SBP



**Figure 1. Distribution of study sample by CAIDE total scores (%)**

$\geq 140$  mmHg had statistically significantly higher total CAIDE scores (Cramér's V coefficient 0.881,  $p < 0.001$ ). Checking the CAIDE scores according to BMI level, there were no cases scored 8 or 9 for BMI  $< 30$  kg/m<sup>2</sup>. Similarly, there were no cases scored by 3, 4 or 5 points for BMI  $\geq 30$  kg/m<sup>2</sup>. Subjects with BMI  $< 30$  kg/m<sup>2</sup> had statistically significantly lower total CAIDE scores (Cramér's V coefficient 0.723,  $p < 0.001$ ). The most frequent CAIDE scores by regular physical activity were 5 and 4 points. Statistically significantly higher total CAIDE scores were associated with absence of regular physical activity (Cramér's V coefficient 0.892,  $p < 0.001$ ;  $\chi^2 = 107.022$ ,  $p < 0.05$ ).

### DISCUSSION

The current study revealed that on average, a medical worker older than 50 years, has normal weight, has no AH or T2DM, never smoked before and does not currently smoke. Less than a half of medical workers are not problematic alcohol users – consumption of alcohol is 100 ml of 13% ABV alcohol once weekly in most cases. However, one third of medical workers had family history of cognitive impairment/dementia within the first or the second-degree relatives. The majority of study participants had no more than 3 risk-increasing factors for developing cognitive impairment/dementia. All subjects had the same dementia risk-decreasing factor – longer than 10 years duration of education. The vast majority were engaged in cognitive activity at their free time, however, respondents were physically inactive and poorly adhered to principles of the Mediterranean diet. Excluding long duration of education, 42.0% of subjects had one cognitive impairment/dementia risk-decreasing factor.

While there were no previous studies that evaluated the risk of developing cognitive impairment/ dementia among medical workers in Lithuania, the results of our study were compared to the national population data. The results of Statistical Health Study of Lithuanian Population in 2014 (SHSLP) were used for this comparison [36].

Overweight and obesity are more prevalent in total Lithuanian population compared to medical community (74.0–76.0% and 56.0% accordingly). The incidence of T2DM was also two times higher in general population in comparison to medical workers, 11.0% and 5.1% respectively. AH was found in 67.0% of Lithuanian population, and 5.1% of medical workers had AH in our study. According to our study, 41.3% of medical workers were physically active. This number is significantly lower in total population – only 7.0% of 55–74-year old population reported exercising regularly to strengthen their muscles.

The lower number of indicators of the interrelated factors (overweight, higher incidence of T2DM and AH, lower physical activity) in health workers compared to total Lithuanian population shows a positive attitude towards healthy lifestyle and prevention of chronic diseases.

This finding is also confirmed by statistics of alcohol consumption and smoking. Alcohol use was less prevalent in medical community than in national population of Lithuania (44.2% and 62.0–81.0% respectively). The prevalence of smoking among Lithuanian medical workers was 10.1%. Current smoking among these healthcare professionals, was lower than in general population (11.0–23.0%).

However, only 26.6% of medical workers followed

the Mediterranean diet. Although consumption of fruit and vegetables is only one element of the Mediterranean diet, 50.0–59.0% of Lithuanian population of age group of 55–74 years had intake of recommended quantity of fruits and vegetables according to the SHSLP data. The issue of inadequate nutrition remains relevant in total population, as well as in medical community.

There are a small number of studies performed in other countries that evaluated the indicators of lifestyle and physical health in medical workers.

When compared the data related to obesity and metabolic syndrome with other researches, the results of our study are more encouraging. It is known that more than a half (64.0%) of Turkey hospital workers aged  $\geq 50$  years has abdominal obesity [37] in comparison to 8.7% in our study sample. According to Halgurd F. Ahmed and authors [38], 57.6% of healthcare providers in Iraq, older than 40 years, have metabolic syndrome.

According to the results of our study, only 41.3% of medical workers were physically active, but studies performed in other countries show even worse results. An Italian study found that only 26.1% of healthcare workers were not physical active. Also, the rates of physical inactivity are high not only among medical community, also in Italian general population [39].

A comparison of harmful habits among medical workers in other countries indicates that the prevalence of smoking is similar among general population and health care professionals in Lithuania and the US. According to Sharna L. and authors [40], healthcare professionals in the US had a smoking rate of 8.34% vs 10.1% in our sample. However, the prevalence of alcohol consumption is higher in our medical workers (44.2%), compared to 71.3% of medical community of the Academic Hospital of Parma, Italy not consuming hard liquor at all [39]. It is possible that these indicators reflect the general trend for alcohol intake in Lithuania.

None in the medical workers sample was evaluated with less than 3 or more than 10 total CAIDE scores. Most often, the CAIDE score according to modifying factors, was increased by absence of regular physical activity. Subjects, who were evaluated with higher CAIDE scores (particularly older than 53 years, obese, physically inactive and with SBP higher than 140 mmHg), had statistically significantly higher risk of developing dementia in 20 years of lifetime. The defined risk of developing dementia in 20 years among medical workers was not higher than 4.2%. According to the control of dementia increasing risk factors, the medical workers could be a good example of healthy lifestyle practitioners in Lithuania. Otherwise, the data of study, which evaluated the risk of the occurrence of dementia in general population of Finland during the 20 years, show the similar risk of developing dementia in Lithuanian medical community (4.2% vs 4%, respectively) [16].

In this study, for the first time, Lithuanian medical workers were evaluated according to the development of the risk factors for cognitive impairment/dementia. This study helped not only to evaluate the incidence of midlife factors, but also to estimate the risk for medical workers to develop dementia in upcoming 20 years. However, our study has a few limitations. Definitely, the small sample size limited our ability to make more detailed evaluation of distribution of the risk factors, to compare them between urban and rural medical workers, men and women, perhaps even in specific professions. Considering future

research, the present study detected a trend, thus additional research is needed to precisely investigate the distribution of the risk factors among medical workers with a larger study sample. An ability to investigate serum cholesterol levels and apolipoprotein E genotype would be also beneficial.

In context of increasing duration of active participation in healthcare labour, as well as expanding requirements and expectations for medical competence and experience, it is extremely important for this professional group to be aware of the risk factors associated with increasing and decreasing the risks of developing cognitive impairment/dementia, and in this way maintaining functional cognitive capabilities.

## CONCLUSIONS

1. Three-quarters of medical workers had no more than 3 risk-increasing factors for developing cognitive impairment/dementia, of which inheritance among the first-degree relatives was the most frequent.

2. The majority of medical workers had two cognitive impairment/dementia risk decreasing factors – long duration

of education and intensive cognitive activity in free time.

3. Regardless of the fact that the risk of developing cognitive impairment/dementia in 20 years of lifetime among medical workers did not exceed 4.2%, the awareness and understanding of the main modifiable risk increasing factors – low physical inactivity and poor adherence to the principles of the Mediterranean diet- could reduce this risk even more.

## Conflicts of interest

Authors declare no conflicts of interest.

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*Received 29 May 2017, accepted 24 July 2017*  
*Straipsnis gautas 2017-05-29, priimtas 2017-07-24*