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Prevalence of cancer risk factors among women radiologists and radiology assistants in Lithuania

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The aim of the work was to study potential cancer risk factors among radiologists and non-radiologists in Lithuania.

Methods. Cancer risk factors were investigated among female medical staff at the departments of ionizing (243, 33.33%) and non-ionizing environment (486, 66.67%). The questionnaire covered the diet, lifestyle, reproductive factors as well as the demographic and physical characteristics. Univariate analysis was done separately for physicians and nurses. Each of risk factors was evaluated in stratified analysis for unequal ORs using Mantel–Haenszel estimate control for age and occupation.

Results. Evaluation of features of risk factors among radiologists *vs.* non-radiologists has shown that smoking was most the prevalent risk factor among radiologists and radiology assistants. Despite the relatively low prevalence, the questionnaire data showed the higher frequency of smoking among radiologists (OR = 2.78, 95%CI 1.12–6.87) and radiology assistants (OR = 2.25, 95% 1.38–3.66) compared to non-radiologists. The prevalence of non-users and occasional users was 74% to 66%, respectively. Alcohol use by smoking among radiologists was influenced insignificantly. The cohort of radiologists in Lithuania offer an opportunity for obtaining direct observational evidence on health effects associated with chronic low-dose radiation exposure. The data on possible cancer risk factors can be helpful for validation of the risks in future.

Key words: cancer risk factors (smoking, drinking, etc.), radiologists

INTRODUCTION

Lifestyle factors related to behaviour and nutrition, such as smoking, drinking, diet rich with animal fats are an important risk factors of cancer, but they weren't thoroughly valued even among medical staff. Besides, studies among health care personnel still lacking attention; lifestyle and other risk factors are more frequently studied in general population (1–5). During the last decade, several studies on medical staff were published, covering the prevalence of smoking (6–14), drinking habits (3), obesity (overweight) (15, 16), reproductive factors (17, 18), family history (19) and cancer (16, 20–23). Data on smoking are not easily available; only a few countries are reporting on smoking patterns of general population and occupational groups including physicians, nurses and medical students (7, 24). There are observations that the prevalence of smoking among medical staff is closely related to that in general population; smoking is highly frequent among health care personnel in Mexico (62.1%) and Poland (61.3%) – countries with a high tobacco consumption. Smoking prevalence among health care personnel in Lithuania is lower than in general population (14.9% *versus* 49%) (25). The prevalence of smoking among health care personnel in selected countries is shown in Table 1.

Table 1. **Prevalence of smoking (%) among health-care personnel in selected countries**

Country	Smoking, %	Number of health-care personnel; source; year
Latvia	30.4	N = 1057; (7); 1996
Mexico	62.1	N = 1092; (8); 1991
Poland	61.3	N = 287; (9); 1992
Italy	39.0	N = 2453; (10); 1998
Spain	36.4	N = 360; (11); 1997
Denmark	35.0	N = 3154; (12); 1992
France	33.0	N = 3082; (13); 1998
UK	23.0	N = 663; (14); 1989
Lithuania	14.9	N = 3090; (25); 2003

Smoking habits are more common among nurses than among physicians (6, 7); only minor variations

are observed among the countries. Data for Lithuania are the same for both professions (25); Latvia: physicians 13.4%, nurses 10.5% (7).

On the European scale, Lithuania is known for a high alcohol consumption, which is estimated at 10 liters per capita. Alcohol drinking habits among radiologists in Lithuania have not been studied so far. It is expected that their alcohol consumption is different from that in general population. Alcohol intake is a strong social indicator and is higher among people having a lower educational level (3).

Associations between the lifestyle factors and cancer have been studied among radiologists in developed countries. The USA cohort data provide evidence on smoking and overweight as one of the prevailing risk factors of cancer compared to alcohol consumption (15). Analysis of the causes of death in the cohort of US radiologic technologists showed that on the top of women's deaths were malignant neoplasms (42.5%), followed by diseases of the circulatory system (26.4%). Drinking did not influence death rates in circulatory system diseases, but we don't ignore the influence of alcohol on the other causes of death, particularly in cases of malignant neoplasms (15, 20, 26). The risk of basal cell carcinoma rises with increasing alcohol intake in the combined group of men and women (P for trend = 0.001), although the risk dropped in the highest consumption category (OR = 1.2; 95% CI = 1.0–1.5 and RR = 1.3; 95% CI = 1.0–1.7 (27). Other studies show the risk of breast cancer (28) and melanoma (21) to increase turice: OR = 2.12; 95% CI = 1.06–4.27 and OR = 2.1; 95% CI = 0.9–4.8, respectively.

The nutritional pattern has been found to differ in Lithuania by sex and education (2). Women have a healthier diet than men. The consumption of fish, vegetables and fruits, the use of vegetable oil for cooking were substantially higher in persons with university degree compared to those with secondary education. The diet of persons with high education was closer to WHO recommendations, but there were exceptions: highly educated persons preferred butter on bread, white bread to brown, and consumed more cheese daily than did people with low education. Obesity and overweight were least prevalent among the highly educated women, but most prevalent among the highly educated men (29). Overweight was defined as BMI > 25 kg/m^2 and obesity as BMI > 30 kg/m^2.

Descriptive data on elevated cancer risks among radiologists in Lithuania (30, 31) induced an inquiry into the lifestyle factors in this occupational group.

The aim of the current work was to study lifestyle and potential cancer risk factors among radiologists and non-radiologists in Lithuania.

MATERIALS AND METHODS

Study population. The study covered the staff (physicians and trained nurses) of medical institutions of Lithuania with the departments of ionizing radiation (radiology, radiotherapy and nuclear medicine; qualifying level ISCO-4 – physicians radiologists and ISCO-3 – radiology assistants). Only subjects with a one year or more working experience were invited to the study.

The staff of departments of the same institutions without sources of radiation (polyclinic, general hospitals) were contacted as controls. Cases and controls were matched by occupation and age (±1.5 years) at a ratio 1:2; 406 radiologists (89 physicians and 317 nurses) were interviewed face-to-face using a revised (1994) CINDI questionnaire; 46 potential cases refused to participate (11.3%).

An interview of a comparative group was carried out simultaneously at each institution. 899 subjects were contacted and 820 were intervied; 79 (9.6%) refused to participate.

Questionnaire and ethics. The questionnaire covered lifestyle factors (smoking, alcohol drinking), diet, reproductive factors (age at menarche, age at menopause, oral contraceptives) and demographic, physical characteristics. The questionnaire was based on CINDI (1994) study. The work was approved by the Bioethics Committee of Lithuania (Protocol N° 01–27, 2002). The study participants were requested to sign the informed consent.

Statistical analysis. Data obtained from questionnaires were coded, entered to the database and analyzed using the SPSS (ver. 9) and STATA (ver. 7) statistical packages. The 'crosstabs' and 'mhodds' procedures were applied for the pair-matched analysis by age and professional group. The matched analysis included 207 physicians (radiologists and non-radiologists) and 522 nurses (radiology assistants and nurses). Women only were included into analysis. Odds ratios (OR) and their 95% confidence intervals (95% CI) were used to estimate the lifestyle factors and other features among radiologists as compared to those of non-radiologists. Univariate analysis was done separately for physicians and nurses. Each of risk factors was evaluated in stratified analysis for unequal ORs using Mantel–Haenszel estimate control for age and occupation.

The distribution of medical staff by age and occupational groups (physicians-radiologists and non-radiologists, radiology assistants and nurses) is shown in Table 2.

The mean age of medical staff working in the environment of ionizing radiation was 47.86 years (SD = 10.49) and of medical staff working without sources of ionizing radiation 47.79 years (SD = 10.53).

Data on smoking and drinking patterns are presented in Table 4. To ascertain the differences in

alcohol consumption, occasional drinkers and never-drinkers we combined into one category.

RESULTS

Evaluation of features of lifestyle risk factors in radiologists *vs.* non-radiologists is presented in Table 5. Based on questionnaire data, physicians were found to differ only in smoking, which was found to be significantly higher OR = 2.78 (1.16–6.65) among radiologists compared to non-radiologists. Radiology assistants compared to nurses were heavier smokers OR = 2.25 (1.39–3.66) and used more of smoked meat products OR = 2.79 (1.27–6.09).

Alcohol consumption was less frequent among radiologists compared to non-radiologists in both professional groups. These groups were the same as regards overweight and obesity, but differed in hypodynamia indices.

Consumption of vegetables, fruit and animal fat was lower among radiologists. Also, occupational stress was lower in radiologists. These observations imply that there are only minor differences among these occupational groups.

Consumption of vegetables and fruits was also less frequent among radiologists and radiology assistants in both oc-

Table 2. **Distribution of physicians-radiologists and non-radiologists, radiology assistants and nurses by age groups**

Age	Physicians-radiologists and non-radiologists		Radiology assistants and nurses	
	N	%	N	%
<35	20	9.7	67	12.8
35–49	104	50.2	287	55.0
50–64	68	32.9	148	28.4
65+	15	7.2	20	3.8
Total	207	100	522	100

Table 3. **Prevalence of risk factors among physicians-radiologists and non-radiologists, radiology assistants and nurses**

Risk factors	Physicians radiologists (N = 69)	Physicians non-radiologists (N = 138)	Total, % (N = 207)	Radiology assistants (N = 174)	Nurses (N = 348)	Total, % (N = 522)
Smoking	16	16	32 (15.7)	44	48	92 (17.6)
Drinking	3	44	47 (23.0)	130	270	400 (76.6)
Stress	50	122	172 (84.3)	142	294	436 (83.5)
Obesity (KM≥30)	8	18	26 (12.7)	29	8	37 (7.1)
Overweight (KMI≥25)	39	70	109 (53.4)	105	209	314 (60.2)
Hypodynamia	48	92	140 (68.6)	101	231	332 (63.6)
Vegetable-milk diet	6	20	26 (12.7)	12	37	49 (9.4)
Smoked meat products	62	120	182 (89.2)	166	307	473 (90.6)
Tinned food	56	117	173 (84.8)	154	308	462 (88.5)
Animal fat	39	97	136 (66.7)	103	236	339 (64.9)
No vegetable-fruits	67	127	194 (95.1)	160	304	464 (88.9)
No vitamins	56	115	171 (83.8)	142	286	428 (82)
Age at menarche >15 years	16	24	40 (19.6)	45	80	125 (23.9)

Table 4. **Smoking and drinking patterns among physicians-radiologists, non-radiologists, radiology assistants and nurses**

Risk factors	Physicians radiologists (N = 69)	Physicians non-radiologists (N = 138)	Radiology assistants (N = 174)	Nurses (N = 348)
		Smoking		
Never-smokers	53	122	130	300
Smokers <5 years	3	7	14	24
Smokers <10 years	4	4	19	12
Smokers < 20 years	8	4	11	10
Smokers > 20 years	1	1	0	2
		Drinking		
Never	3	44	18	107
Some times per year	48	47	112	163
Some times per month	15	44	38	74
Some times per week	3	3	6	4
Every day	0	0	0	0

Table 5. **Risk factors among radiologists *vs.* non-radiologists and radiology assistants *vs.* nurses**

Risk factors	Radiologists *vs.* physicians non-radiologists OR (95%CI)	Radiology assistants *vs.* nurses OR (95%CI)	Differences among risk factors
Smoking	2.78 (1.16–6.65)	2.25 (1.39–3.66)	No
Alcohol	1.46 (0.77–2.79)	0.85 (0.55–1.31)	Underlying
Stress	0.33 (0.15–0.74)	0.82 (0.50–1.32)	No
Hypodynamia	1.15 (0.61–2.20)	0.67 (0.45–1.00)	Underlying
Meat products	1.00 (0.47–2.14)	1.07 (0.73–1.56)	No
Smoked meat products	1.31 (0.53–3.22)	2.79 (1.27–6.09)	Considerable
Tinned food	0.77 (0.34–1.66)	1.00 (0.56–1.79)	No
Animal fat	0.57 (0.32–1.03)	0.68 (0.46–1.00)	No
Vegetables and fruits	0.36 (0.08–1.61)	0.62 (0.33–1.15)	No
Vitamins	0.85 (0.39–1.87)	0.96 (0.60–1.54)	No
Obesity (KMI > 30)	0.88 (0.36–2.12)	0.67 (0.42–1.08)	No
Overweight (KMI > 25)	1.31 (0.70–2.44)	1.04 (0.70–1.55)	Underlying
Age at menarche (> 15m.)	1.47 (0.70–3.09)	1.18 (0.77–1.81)	Underlying
Oral contraceptives	1.20 (0.52–2.76)	0.77 (0.44–1.35)	Underlying
No parity	0.93 (0.38–2.27)	0.77 (0.45–1.29)	No

Table 6. **Radiologist *vs.* non-radiologists: relationship between alcohol use and smoking among physicians and nurses**

Occupation	Smoking	Alcohol (once a month and more *vs.* no and occasional) Odds ratio (95% CI)	P, test of OR homogeneity
Physicians-radiologists	Non-smokers	1.28 (0.31–5.30)	0.6849
	Smokers	1.79 (0.83–3.88)	
Radiology assistants	Non-smokers	0.78 (0.34–1.77)	0.4358
	Smokers	1.15 (0.67–1.98)	

Table 7. **Radiologists *vs.* non-radiologists: relationship between stress and smoking among physicians and nurses**

Occupation	Smoking	Stress Odds ratio (95% CI)	P, test of OR homogeneity
Physicians-radiologists	Non-smokers	0.24 (0.03–1.60)	0.6243
	Smokers	0.39 (0.17–0.93)	
Radiology assistants	Non-smokers	0.55 (0.17–1.73)	0.4667
	Smokers	0.88 (0.52–1.53)	

Table 8. **Radiologists *vs.* non-radiologists: relationship between nutrition habits (smoked meat) and smoking among physicians and nurses**

Occupation	Smoking	Nutrition (smoked meat) Odds ratio (95% CI)	P, test of OR homogeneity
Physicians-radiologists	Non-smokers	1.00 (0.11–8.40)	0.7593
	Smokers	1.44 (0.49–4.20)	
Radiology assistants	Non-smokers	3.90 (0.41–37.60)	0.7083
	Smokers	2.47 (1.07–5.73)	

cupational groups. The high prevalence of smoking among radiologists (OR = 2.78, 1.12–6.87) most probably influences the other variables. As we have found from stratified analysis (Table 6), alcohol users among radiologists and radiology assistants were insignificantly influenced by smoking in both occupational groups.

Sometimes smoking is related to stress. We have tested the hypothesis and found stress to be a not important factor for smoking (Table 7): both occupational groups showed the same pattern – radiologists valued stress lower as compared to non-radiologists.

The use of smoked meat is an important factor. As we have found, the habit of consuming smoked

meat was more frequent among radiology assistants than in physicians (Table 8).

Medical radiation worker cohorts offer one of the few opportunities for obtaining direct observational evidence on health effects associated with chronic low-dose radiation exposure. Data on potential cancer risk factors can be helpful for validation of the risks. It is expected that the study will contribute to a systematic and more informative evaluation of risks among radiologists and radiology assistants.

CONCLUSIONS

1. Analysis of lifestyle risk factors among women radiologists *vs.* non-radiologists has shown that smoking is the most prevalent risk factor among physicians-radiologists and radiology assistants. Smoking prevalence among physicians and nurses is lower than in general population (15.7% and 17.6%, respectively). Despite the relatively low prevalence, the questionnaire data showed a higher frequency of smoking among radiologists (OR = 2.78, 95%CI 1.12–6.87) and assistants (OR = 2.25, 95% 1.38–3.66) as compared to non-radiologist physicians and nurses.

2. Alcohol consumption was not less frequent among radiologists compared to non-radiologists in both professional groups. The prevalence of non-users and occasional users was 74% and 66%, respectively. The use of alcohol among radiologists was insignificantly influenced by smoking.

3. The cohort of medical radiation workers in Lithuania offers one of the few opportunities for obtaining direct observational evidence of health effects associated with chronic low-dose radiation exposure. The data on lifestyle factors can be helpful for assessing of the risks in future.

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VËÞIO RIZIKOS VEIKSNIØ PAPLITIMAS TARP LIETUVOS GYDYTOJØ RADIOLOGIØ IR JØ ASISTENÈIØ

S a n t r a u k a

Šio darbo tikslas buvo iðtirti gyvenimo bûdo ir kitus galimus vëþio rizikos veiksnius tarp Lietuvos gydytojø radiologiø, jø asistenèiø, neradiologiø ir bendrosios praktikos slaugytojø.

Metodika. Vëþio rizikos veiksniai buvo tiriami tarp moterø medikiø, dirbanèiø jonizuojanèioje (243, arba 33,33%) ir nejonizuojanèioje aplinkoje (486, arba 66,67%). Klausimynas apëmë mitybos, gyvenimo bûdo, reprodukcinius veiksnius ir demografines, fizines charakteristikas. Galimybiø santykiai buvo vertinti remiantis vienaveiksne gydytojø radiologiø ir jø asistenèiø analize atskirai. Rizikos veiksniø sàveika ávertinta pagal stratifikuotà tyrimà, atsiþvelgiant á amþiø ir profesijà (Mantel-Haenszel' testas).

Rezultatai. Nors rûkymas buvo labiausiai paplitæs rizikos veiksnys tarp gydytojø radiologiø (ÐS = 2,78; 95%PI = 1,12–6,87) ir jø asistenèiø (ÐS = 2,25; 95%PI = 1,38–3,66), lyginant su gydytojais ir bendrosios praktikos slaugytojomis, taèiau tarp gydytojø ir bendrosios praktikos slaugytojø ðis þalingas áprotis buvo retesnis negu Lietuvos populiacijoje. Nevartojanèiø ir retai vartojanèiø alkoholá radiologiø ir asistenèiø buvo 74% ir 66% atitinkamai. Gydytojø radiologiø rûkymas neturëjo reikðmës alkoholio vartojimo áproèiui. Ilgalaikiø, maþø jonizuojanèios spinduliuotës doziø fone atsirandanèiø sveikatos pokyèiø stebëjimas tarp Lietuvos medicinos darbuotojø, dirbanèiø jonizuojanèioje aplinkoje, suteikia galimybæ siekti iðsamaus ðios profesinës grupës þmoniø vëþio rizikos ávertinimo. Gyvenimo bûdo ir kitø galimø vëþio rizikos veiksniø tyrimo duomenys bus naudingi tolimesniame tyrimo etape, vertinant piktybiniø navikø rizikà tarp ðios grupës darbuotojø.

Raktaþodþiai: vëþio rizikos veiksniai (rûkymas, alkoholio vartojimas ir kt.), radiologai