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RISK FACTORS OF LUNG CANCER IN KAZAKHSTAN: AGE, SMOKING, ALCOHOL AND OBESITY.

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Abstract

Introduction: Lung cancer is the most common form of cancer and the main cause of cancer death in Kazakhstan. Aim: To examine the prevalence of risk factors for lung cancer among the urban population of Astana. **Material and Methods:** Cross-sectional analysis of a prospective, observational study. Attended by 1 996 respondents aged 25 years to 75 years, smokers and former smokers or never smoked. Anthropometric data, social status and frequency of alcohol consumption were studied. Statistical analysis used: the mean and standard deviation, Z statistical P value, $\chi 2$ was performed with programs PASW Statistics 18 and MedCalc. **Results:** Body mass index of the smokers and non-smokers is above the upper limit of normal. There were significantly more individuals who are overweight in the group of former smokers, than among smokers. High level of education influences the frequency of smoking. People of Asian nationalities were more likely to smoke than Kazakhstan European nationalities, while Asians were significantly more likely to give up smoking, than the Europeans. A direct relationship between the prevalence of factors of smoking and marital status: not smoking is much higher among the married ones, than among the divorced and single Kazakhstan citizens. **Conclusions:** The study of the prevalence of risk factors allows to select the target population and to carry out the individual selection of the screening programs, including early screening of lung cancer.

Keywords: *lung cancer, smoking, BMI, alcohol, obesity.*

Introduction

Lung cancer is the most common form of cancer and the main cause of cancer death in Kazakhstan. The share of the trachea, bronchi and lung cancer accounts for 20.4% all new cancer cases of men and 6.86% of all deaths in both sexes [*Z. Ismailov, 2006*].

According to Chinese clinical recommendations all population with suspicion of lung cancer should be include in the survey algorithm: who have a smoking history or current smokers with more than 400 cigarettes / year, people with a history of occupational or family risk at the age of 45 years or above [*Xiu-yi Zhi et al., 2012*].

Smoking is a major factor that increases the risk of lung cancer in 5-10 times, and depends on the number of pack / years. Although smoking is a lifelong risk factor, the most effective way to reduce the incidence is smoking cessation [*Sagawa M, et al., 2012; V.Bagnardi, et al. 2010*].

The rate of the exposure depends aside from smoking, and also overweight and alcohol consumption. It is known that the prevalence of risk factors depends on social status, namely, the level of education and wages [*Xiu-yi Zhi et al., 2012;*

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Sagawa M, et al., 2012]. Consequently, efforts to fight against bad habits will reduce the incidence of lung cancer.

Kazakhstan does not have a national program on lung cancer screening. This study focuses on prevalence the main risk factors: smoking, obesity and excessive alcohol consumption and also selection of patients in urban clinics for screening programs, for improvement of management in the early diagnosis of lung cancer.

MATERIAL AND METHODS:

Design of the prospective observational study of the target population is made by the scientific team of JSC "National Science Cardiac Surgery Center" in collaboration with the Cancer Center of Astana city, National Scientific center of surgery and urban health centers in the period from May to December 2015. Stratification was made by surveying 1,996 respondents in the four urban polyclinics in Astana, number 1, 2, 6 and 7. All participants under the age of 25 years to 85 years were stratified into groups: smokers at the moment and non-smokers, including former smokers for the last 15 years and who had never smoked (smoked less than 100 cigarettes in their lives). Study participants were recruited with the assistance of medical personnel urban clinics. The survey was carried out by researchers, with the informed consent of the research participants. The form of the questionnaire takes into account the following data: a history of smoking, frequency of alcohol consumption, body mass index, education level and ethnicity. The study protocol, informed consent form and questionnaire developed in accordance with the principles of the Declaration of Helsinki (2013) and approved by the Local Commission on Bioethics of JSC "National Science Cardiac Surgery Center». In the study was respected the principles of confidentiality information, anonymization of data with limited access to information.

The anthropometric data was collected: body mass index (BMI), the ratio of body weight (m) to the square of the height (h^2), which was estimated according to the International Obesity classification recommended by the WHO [*S.Inoue, 2000*].

Social status was rated, as well as smoking and alcohol consumption. The frequency of alcohol consumption was assessed as not drinking, occasionally drinking (3-6 months), frequent drinkers (monthly), and often drinking (weekly or more).

Statistical analysis of the mean and standard deviation, Z statistical, Pvalue, $\chi 2$ was performed with programs PASW Statistics 18 and MedCalc.

RESULTS

The average age of study participants was 59.3 ± 11.6 years: in the group of smokers at the moment - 57.4 ± 8.7 years in the group of smokers - 60.1 ± 12.6 years. (Table 1) Among the covered questioning of respondents aged 25 years to 65 years, the proportion of smokers patients was 32.11%, which is significantly less than former smokers or never-smokers 63.38%, CI95% (26.93; 36.04), P_{value} < 0.05. The proportion of participants in the age range with the highest probability of cancer risk, from 66 to 75 years, was much more among quitters p = 0.21 (13.68%) than among smokers p = 0.12 (3.91%), $\chi 2$ -5.67, CI95 % (1.77; 15.35), P_{value} <0.05.

Smoking status: Among the patients interviewed, the proportion of non-smokers was 1351 (67.7%) 1271 (63.7%) of them quit smoking in the last 15 years, and 84 were never-smokers (4.2%), compared to 641 (32.1%) patients continuing to smoke at the time of the survey. Among them, 4.9% quit smoking a year ago, 2.7% two years ago, 22.7% five years ago and 36.6% more than 10 years ago.

The average number of cigarettes smoked in both groups of smokers and non-smokers was 25.4 ± 7.4 pack/year in the group of smokers at the time of the survey smoked 28.1 ± 7.6 pack/year, while in the group of former smokers 24.0 ± 6.9 pack/year. Smoking analysis showed the majority of the patients to have an experience of smoking up to 10 years - 37.3%, and beginning to smoke with an experience up to 5 years - 27.7%.

Social status: Analysis of the influence of marital status on the habit of smoking showed that there are more smoking Kazakhstan citizens among the married ones 43.29% against the single respondents 0.5%, χ^2 -7.38, CI95% (11.47; 46.20), P_{value} <0.05. Table 1.

Results of the study revealed a direct link between smoking prevalence factor and marital status: OR = 12.77, CI95% (6.53; 24.98), (P_{value} <0.05). Table 2.

Stratification within the group of the married respondents showed that the proportion of current smokers p = 0.76 (24.4%) is higher than the pro-

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Table 1.

Main characterisctics

	Smokers	%	Non-smokers	%	95% CI	Chi-squared
Number of respondents	641	32.11	1351	67.69	26.93;36.04	170.43
Age	57.4±8.7		60.1±12.6			
Male (%)	603	30.21	1197	59.97	24.93;34.37	141.97
Female (лет)	38	1.90	158	7.92	-5.33; 11.70	1.75
Up to 65 years old (%)	560	28.06	970	48.60	15.48;25.42	61.84
66-74 years old (%)	78	3.91	273	13.68	1.77; 15.35	5.67
Older than 75 years old (%)	5	0.25	135	6.76	-5.84;12.15	0.33
Social status						
Higher and / or specialized secondary education (%)	199	9.97	432	21.64	5.36; 17.31	12.57
Secondary education (%)	236	11.82	114	5.71	-0.99; 12.05	3.23
Marital status						
Married	487	24.40	864	43.29	13,63; 23.93	47.92
Divorced and not married	72	3.61	10	0.50	-28.17; 10.42	0.27
Ethnicity						
Asian	494	24.75	884	44.29	14.31; 24.56	51.70
European	141	7.06	432	21.64	7.85; 20.12	15.25

* Statistically significant difference among smokers and never-smokers or quitters

Table 2.

The impact of the level of education and marital status on the prevalence of smoking

	Higher /specialized secondary education	Secondary education	Chi-squared	P_{value}	OR	95% CI	Z
Education level							
Smokers	199 (9,97%)	236 (11,82%)	1.85	> 0. 05	4.49	3.39; 5.94	10.53
Non-smokers	432 (21,64%)	114 (5,71%)	15,27	< 0.05*			
Marital status							
	Married	Single					
Smokers	494 (24,75%)	141 (7,05%)	15,91	< 0.05*	12.77	6.53; 24.98	7.4
Non-smokers	864 (43,29%)	10 (0,5%)	7,38	< 0.05*			

* Statistically significant difference among smokers and never-smokers or quitters

portion of former smokers p = 0.68 (43.29%), χ^2 -47.92, CI95% (13.63; 23.93), P_{value} <0.05. Table 1. Among the Kazakhs with unsettled family life, single and divorced, there are more smokers p = 0.11 (3.61%) than former smokers p = 0.01 (0.5%), χ^2 -0.27, CI95% (-28.17; 10.42), P_{value} > 0.05.

The degree of incidence of smoking is affected by the level of education of Kazakhstan: there are significantly more quitters 21.64% with higher and / or specialized secondary education than the Kazakhs with only compulsory secondary education 5.71%: OR = 4.49, CI95% (3.39; 5.94), (P_{value} <0.05). Table 2. Analysis of the prevalence of smoking showed that the proportion of non-smokers or former smokers with university and / or specialized secondary education p = 0.34 (21.64%) is significantly higher than the proportion of smokers p = 0.31 (9.97%), χ^2 -12.57, CI95% (5.36; 17.31), P_{value} <0.05. Table 1. The results confirmed the internal stratification of the group quitters: 21.64% of respondents with higher levels of education, which is significantly more than non-smoking respondents with lower compulsory secondary education level of 5.71%, χ^2 -15.27, CI95% (8.85 ; 21.37), P_{value} <0.05.

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Although stratification among the participants of the survey with the obligatory secondary education showed that the proportion of non-smokers p = 0.34 (5.71%) was not statistically significantly greater than the proportion of smokers p = 0.31 (11.82%), χ^2 -3.23, CI95% (-0.99; 12.05), $P_{value} > 0.05$.

The study was attended by 69.04% of the representatives of Asian ethnic groups (indigenous people of Asia and Asian part of Eurasia) and 28.71% of the Europeans (descendants of European nations), while the remaining 2.25% of mestizo. Among smokers significantly more participants Asian nationalities 0.77 (24.75%) than Europeans 0.22 (7.05%) χ^2 -20.81, CI95% (11.00; 23.13), P_{value} <0.05. Although there is no ethnic homogeneity among the study participants, the study found that Asians are significantly more likely to drop out of smoking p = 0.65 (44.29%) than Europeans p = 0.32 (21.64%), CI95% (17.23; 27.62), $P_{value} < 0.05$.

Alcohol and excess weight: The average body mass index among smokers was 26.1 ± 4.4 kg/m^2, and 26.6 ± 4.7 kg/m^2 for the group of former smokers, which is above the upper limit of normal. Table 3. The proportion of patients with excess weight average BMI 29.1 ± 4.3 kg/m^2, is higher in the group of former smokers p = 0.59 (37.42%) than among current smokers p=0.39 (12.63%) with an index BMI 29.3 ± 3.6 kg / m2, CI95% (18.90; 30.03), P_{value} <0.05. The number of patients with underweight among quitters p=0.05 (3.01%) with BMI 18.6 ± 0.9 kg/m^2 equally occurred among smokers p = 0.03 (1.05%) with BMI 18.9 ± 0.9 kg/m^2, χ^2 -0.24, CI95% (-15.17; 10.06), (Pvalue≥0.05).

Patients with a set of risk factors: age, overweight and frequent use of alcohol equally occurred in the group of smokers p = 0.02 (0.6%) and in the group of former smokers p=0.01 (0.4%), CI95% (-36.93; 27.05), ($P_{value} > 0.05$). In addition, the proportion of patients not consuming alcohol with a high BMI is greater among smokers p = 0.36 (24.2%) than not drinking alcohol overweight p = 0.19 (6.1%), but continuing to smoke (P_{value} <0.05).

Gender characteristics: The study involved 1800 (90.18%) men and 196 (9.82%) women. The average age was lower for women, 54.9 ± 14.1 years, than for men 59.3 ± 11.2 years.

Tuberculosis and other comorbidities: There were patients registered in the TB dispensary 6.7%, with a history of viral hepatitis, 3.4% and oncologic pathology other sites 0.9% in both groups of smokers and former smokers. The survey did not reveal HIV / AIDS data in the history of the study participants.

DISCUSSION

The most effective way to fight against lung cancer is to stop smoking. Quitting smoking before the age of 40 years can reduce mortality associated with the continued smoking up to 90% [*Prabhat Jha, 2014; Michael T. Jaklitsch, 2012*]. Life expectancy among smokers may be increased from 4

TABLE 3.

Frequency of smoking with respect to BMI and alcohol consumption

	Smokers	%	Non-smokers	%	95% CI	Chi-squared
Number of cigarettes (pack/years)	28.1±7.6	-	24.04±6.9	-	-	4.21
Body weight						
Average BMI (kg/m^2)	26.09±7.6		26.6±4.7			
Overweight	252	12.63	747	37.42	18.90; 30.03	53.29
Average BMI (kg/m^2)	29.33±3.6		29.05±4.3			
Underweight	21	1.05	60	3.01	-15.17; 10.06	0.24
Average BMI (kg/m^2)	18.9±0.87		18.6±0.9			
Alcohol						
Often drink	64	3.21	15	0.75	-20.04; 10.24	0.272
Never drink	294	14.73	930	46.59	26.25; 36.90	95.29
Alcohol and overweight	12	0.60	8	0.40	-24.93;34.37	0.004

* Statistically significant difference among smokers and never-smokers or quitters

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to 10 years depending on the age of smoking cessation [*Prabhat Jha, 2014*].

Over 85% of cases of lung cancer detected during screening reach 5-year survival rate, while, lung cancer detected at a later stage, invariably leads to death within two years [*Villanti AC, 2013; Henschke CI, 2006*].

Obesity as a risk factor for lung cancer has controversial value. There are reports claiming that the increased risk of lung cancer associated with being overweight occurred at a later age. If the patient has been overweight since a relatively early age OR = 0.69, CI95% (0.50-0.95), and for patients who are relatively new overweight OR = 2.30, CI95% (1.30-4.10) [*L.Smith, 2012; El-Zein M, 2013*]. A risk factor of lack of body weight is not excluded and may also be associated with a higher risk of lung cancer [*El-Zein M, 2013*].

Alcohol abuse increases the overall adverse effects for smokers and contributes to the risk of developing lung cancer [*Freudenheim JL, 2005; Winkler Th.W., 2015*]. A higher risk of developing lung cancer have non-drinking OR = 1.42, CI95% (1.03; 2.01) and very heavy drinkers OR = 1.44, CI95% (1.01; 2.07), than the seldom-drinkers [*Freudenheim JL, 2005*].

The results of our study revealed a direct link between smoking prevalence factor and marital status: OR = 12.77, CI95% (6.53; 24.98), (P_{value} <0.05). Continue smoking p = 0.76 (24.4%) among married composed, significantly more than non-smokers married (p = 0.68).

The degree of incidence of smoking is affected by the level of education of Kazakhstan: there are significantly more quitters 21.64% with higher and / or specialized secondary education than the Kazakhs with only compulsory secondary education 5.71%: OR = 4.49, CI95% (3.39; 5.94), (P_{value} <0.05).

Conclusion

In conclusion, the results of the study of the prevalence of risk factors for lung cancer among Astana urban population correspond to the results of the studies of lung cancer risk factors, which are the main causes of morbidity in Europe, and have the same risk for the Eurasian multinational population of Kazakhstan. This allow to be stratificates Kazakh population for participate in the lung cancer screening with the low doses computer tomography concerning of exist smoking, age and also social, alcohol and overweight status, that will help to select the strong target population and increase the effectiveness of screening.

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