შესაძლებელია იყოს პროგრამის მოცვის დაბალი მაჩვენებლის ერთ-ერთი მიზეზი. ტრეინინგ კურსების შედეგად არსებული ცოდნა მნიშვნელოვნად გაუმჯობესდა. აუცილებელია შემდგომი კვლევის ჩა-

ტარება საგანმანათლებლო კურსების ეფექტურობის შეფასებისა და პჯდ ექიმების მიერ პაციენტთა სკრინინგის პროგრამაში დროულად ჩართვის უზრუნველყოფის მიზნით.

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# KNOWLEDGE OF GEORGIAN POPULATION TOWARDS AIR POLLUTION AND HEALTH EFFECTS OF LEAD CONTAMINATION

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Environmental pollution is one of the major problems for the world, which poses as a great threat to human health and the environment. One of the main causes of polluted environment is air pollution, which includes two types: ambient air pollution and household air pollution. Main sources of air pollution are: affected vehicles, power generation, burning of fuel and waste in household conditions, agriculture/waste incineration and various industrial activities.

According to the World Health Organization (WHO), air pollution kills an estimated seven million people worldwide every year. high rates of air pollution are most often recorded in low and middle-income countries, around 91% of the world's population live in places where air quality levels exceed WHO limits [12].

Polluted air increases the risk of lung cancer and lower respiratory tract, brain and cardiovascular diseases. Lung cancer accounts for about 26% of all cancers and is ranked as the deadliest cancer among males and the second deadliest cancer among females. Ambient air pollutants are associated with lung cancer incidence and mortality [3,6,11]. Ecological study, which was conducted in Los Angeles (LA), has related air pollution exposures to survival in patients diagnosed with lung cancer [13].

Polluted air creates health risk for people with cardiovascular diseases. Clinical and epidemiological studies demonstrate that short- and long-term exposure to air pollution increases mortality due to respiratory and cardiovascular diseases [2,9].

The main source of air pollution in Georgia is transport emissions. People who are often in motion near the road, especially during rush hours, are at risk of poor health outcomes.

Since January 26, 2019, the website www.air.gov.ge was launched and since then, any willing person can track air pollution indicators online throughout the country. Via website one can check the main air pollutants according to their level of pollution.

In autumn in Georgia, people often burn fallen leaves and the produced smoke has severe health effects. Smoke of the burning leaves contain small solid particles and hydrocarbons, including toxic irritants, potential carcinogens such as benzo (a) pyren, as well as a substance common in the smoke of the leaves - carbon dioxide. Inhalation of solid particles may cause respiratory diseases, reduce the amount of inhaled air and affects the ability for the lungs to use this air.

One of the main pollutants in the environment is also a heavy metal lead, which in large quantities can damage our health. Lead poisoning is especially dangerous in children and pregnant women. Lead could be found anywhere in our environment - in the air, on the ground, in the water and also in our homes [1].

Lead and lead-containing substances are used in products which are used in our daily lives. These may be paints, items or walls painted with lead-containing paints, ceramic items, stained glass, pipes and plumbing materials, cosmetics, batteries and military equipment. Children may also come in contact with lead-contaminated toys. Lead poisoning in children may cause hyperactivity, growth retardation and developmental problems, mental retardation, behavioral disorders, reduced intelligence quotient (IQ) and anemia [10].

Lead poisoning is one of the major public health topics in Georgia. For the past several years, the country has launched various laboratory methods to determine level of lead in blood, while a large part of the population has no information about it.

**Material and methods.** The goal of this study was to assess the level of knowledge about air pollution and the health effects of lead in the population of Georgia.

In Georgia in 2019, within the framework of the project "Protect Environment" conducted by the National Center for Disease Control and Public Health and Health Research Union, the online survey was carried out using a Facebook advertisement, which included the title, body text, the banner and the link to the questionnaire. The target population was the whole country and the language used was Georgian. We collected information on knowledge about health problems caused by polluted air, diverse environmental pollutants (smoke of burning leaves, cigarette butts and smoke, effects of lead, etc.), effectiveness of the face mask against polluted air and awareness of the informational website www.air.gov.ge.

Statistical Analyses: Data entry, management and analyses were conducted using the statistical package SPSS v.22.0 (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY). Descriptive statistics were computed to describe the level of knowledge of the respondents about environmental pollution.

**Results and discussion.** The study was conducted in October 2019. It lasted for 3 days and 349 people participated in the survey. Major findings of our study were the following: most of the respondents (90.3%) correctly answered the question related to air pollution causing different types of diseases. 4.6% of surveyed individuals think that air pollution can cause respiratory diseases, 4.0% – cancer, 1.1% - cardiovascular diseases; while 90.3% of respondents defined correctly that air pollution can cause all of the above-mentioned health problems.

Due to the great importance of the health effect of smoke related to burning leaves in Georgia, we asked the participants about the harms of smoke from burning leaves. Based on the survey results, only 77.9% of the study participants answered these questions correctly, stating that smoke from burning leaves pollutes the air. The remaining 11.7% did not know about its harmful effects and according to 10.3% of respondents the smoke is not harmful.

The study also covered one of the major public health issues, such as smoking and the environmental pollution caused by cigarette butts. According to the results, majority of study participant (89.7%) were aware that cigarette butts are one of the important environmental pollutants. This finding is consistent with some other studies. For example, a similar study was conducted in 4 cities of the United States in 2012, where the survey about the dangers of cigarette waste was conducted for population over 18. Based on the results, 72.3% of the study participants stated that cigarette butts are toxic and harmful for environment [4].

To prevent the harmful effect of the polluted air, people often use face masks that slightly protects a person from polluted air. We asked the participants whether it is possible to use a face mask to prevent the harmful effects of air pollution. According to our study, majority of the study participants did not have correct information about the risk of airborne contamination of the outer surface of the mask increasing the health risk [5]. Only 46.1% of respondents identified correctly that facemasks don't protect us from polluted air, the remaining 42.1% think that face mask can protect them from polluted air and 11.7% does not know.

Several questions have been asked about lead poisoning. The first question was inquiry about the ways the lead enters the body. 7.4% of the study participants think that the human body can be exposed to lead through the lead-containing paint dust, 2.6% reported children's toys, as a risk factor of lead exposure, while 2.0% thinks the lead poisoning could be caused by lead-containing cosmetics and according to 1.7% of the study participants, the lead gets into the human body only through food or drinking water. Majority of study participants (86.2%) were fully aware of the ways of lead poisoning and stated that all of the above products can expose to the lead.

Exposure to high levels of lead in human body can result in decrease performance of various organs and damage organ systems. We asked the study participants about the harmful effects of lead on human body and 15.2% of them stated that exposure to high levels of lead may cause brain damage, 4.9% thinks that lead harms only liver, while 2.3% says that lead poisoning causes kidney damage and 0.9% thinks it harms bone-skeletal system. The majority of study participants (76.8%) answered this question correctly – exposure to large amounts of lead in the human body damages all the above-mentioned organs and organ systems.

Study participants were asked if they had information about the test measuring the blood lead level. Only 75.6% of the study participants confirmed that they had information the laboratories where blood lead level is measured. According to 8.0% of the study participants, such test is not available and the remaining 16.3% has no information about this at all.

*Table 1. Knowledge of air pollution among surveyed individuals*

| Characteristics | N | % |
|---|---|---|
| **What health problems can air pollution cause?** | | |
| Respiratory diseases | 16 | 4.6 |
| Malignancies | 14 | 4.0 |
| Cardiovascular diseases | 4 | 1.1 |
| All of the above | 315 | 90.3 |
| **Do you think that smoke of burning leaves pollutes the air?** | | |
| Yes | 272 | 77.9 |
| No | 36 | 10.3 |
| I don't know | 41 | 11.7 |
| **Do you think that cigarette butts and smoke pollute the environment?** | | |
| Yes | 313 | 89.7 |
| No | 15 | 4.3 |
| I don't know | 32 | 6.0 |
| **Do you think facemasks help reduce the harmful impacts of air pollution?** | | |
| Yes | 147 | 42.1 |
| No | 161 | 46.1 |
| I don't know | 41 | 11.7 |

*Table 2. Lead pollution related characteristics*

| | N | % |
|---|---|---|
| **How does lead enter the body?** | | |
| Paint dust | 26 | 7.4 |
| Kid's toys | 9 | 2.6 |
| Cosmetics | 6 | 1.7 |
| Food or drinking water | 7 | 2.0 |
| All above | 301 | 86.2 |
| **What can be damaged by exposure to high levels of lead?** | | |
| Brain | 53 | 15.2 |
| Liver | 17 | 4.9 |
| Kidneys | 8 | 2.3 |
| Bones | 3 | 0.9 |
| All above | 268 | 76.8 |
| **Can lead level be measured in the blood by laboratory test?** | | |
| Yes | 264 | 75.6 |
| No | 28 | 8.0 |
| I don't know | 57 | 16.3 |

We also found out that more than half of the study participants (52.1%) were not informed about an informational web-site: www.air.gov.ge where it is possible to obtain necessary details about air pollution. Only 47.9% of the participants knew about this site.

According to the results of the survey, most of the Georgian population (90.3%) is exposed to public information about environmental pollution, most of the participants were concerned about the impact of air pollution and the impact of exposure to lead.

Based on the results, it is necessary to promote the educational websites that cover and provide detailed information about various contaminants, as well as different preventive measures to help prevent environmental pollution.

The weakness of the survey is the lack of demographic characteristics of the study group, making it impossible to understand the knowledge level by age and gender. Another limitation is the online survey. The information about the awareness of Georgian population on air pollution and lead poisoning is limited. These findings can be used during the planning of educational campaigns to raise awareness on air pollution.

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**SUMMARY**

**KNOWLEDGE OF GEORGIAN POPULATION TO-WARDS AIR POLLUTION AND HEALTH EFFECTS OF LEAD CONTAMINATION**

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The goal of this study was to assess the level of knowledge about air pollution and the health effects of lead exposure among the population of Georgia. In 2019, a project entitled "Protect Environment" was conducted by the National Center for Disease Control and Public Health and the Health Research Union. The online survey was carried out using a Facebook advertisement, which included the title, body text, the banner, and a link to the questionnaire. The target population was the entire country and the language used was Georgian. We collected information on knowledge about health problems caused by polluted air, diverse environmental pollutants (such as the smoke of burning leaves, cigarette butts and smoke, effects of lead), and the effectiveness of a face mask to filter pollutants. Finally, we assessed awareness of the informational website www.air.gov.ge. The study was conducted over 3 days among 349 respondents in October 2019. Most (90.3%) of the respondents correctly answered the question related to air pollution causing different types of diseases, a similar proportion were concerned about the impact of environmental pollution and the impact of exposure to lead (76.8%). These findings indicate the importance of promoting educational websites that provide detailed information about various contaminants, as well as different preventive measures to mitigate environmental pollution. This study provides important information about the level of awareness among the Georgian population regarding air pollution and lead poisoning, research which is still very nascent. These findings should inform the development of educational campaigns to raise awareness about air pollution.

**Keywords:** Environmental pollution, health effects of lead, air pollution.

**РЕЗЮМЕ**

**ЗНАНИЯ НАСЕЛЕНИЯ ГРУЗИИ О ЗАГРЯЗНЕНИИ ВОЗДУХА И ПОСЛЕДСТВИЯХ ВОЗДЕЙСТВИЯ СВИНЦА НА ЗДОРОВЬЕ**

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Целью исследования явилась оценка уровня знаний о загрязнении воздуха и последствиях воздействия свинца на здоровье населения Грузии. В 2019 году Национальный центр по контролю заболеваний и общественного здоровья с Союзом медицинских исследований провели проект под названием «Защита окружающей среды». Онлайн-опрос проводился с использованием рекламы в Facebook, вклю-чающей заголовок, основной текст, баннер и ссылку на анкету. Целевым населением была вся страна и использовался грузинский язык. Собрана информация о проблемах со здоровьем, вызванных загрязненным воздухом и другими загрязнителями окружающей среды (дым горящих листьев, сигаретные окурки и дым, загрязнение свинцом) и об эффективности масок (респираторы) для фильтрации воздуха при поступлении в организм. Оценена осведомленность об информационном сайте www.air.gov.ge. Исследование проводилось в течение 3 дней среди 349 респондентов в октябре 2019 года. Большинство (90,3%) респондентов правильно ответили на вопрос, связанный с загрязнением воздуха, вызывающим различные типы заболеваний, примерно столько же были обеспокоены влиянием загрязнения и воздействия свинца на окружающую среду (76,8%). Полученные результаты указывают на значимость продвижения образовательных веб-сайтов, которые предоставляют подробную информацию о различных загрязнителях и превентивных мерах по снижению загрязнения окружающей среды. Авторами представлены данные об уровне осведомленности населения Грузии о загрязнении воздуха и отравлении свинцом окружающей среды, которые следует использовать при разработке образовательных кампаний по повышению осведомленности о загрязнении воздуха.

რეზიუმე

ჰაერის დაბინძურებისა და ტყვიის მავნე ზემოქმედების შესახებ მოსახლეობის ცოდნის დონის შეფასება საქართველოში

[1]გ. ყანჩელაშვილი, [1]ლ. გულბიანი, [2]ა. დეკანოსიძე, [2]ლ. კვაჭანტირაძე, [1]გ. კამკამიძე, [2]ლ. სტურუა

[1]ჯანმრთელობის კვლევის კავშირი თბილისი, საქართველო; [2]დაავადებათა კონტროლისა და საზოგადოებრივი ჯანმრთელობის ეროვნული ცენტრი, თბილისი, საქართველო

მსოფლიოსთვის დიდ პრობლემას წარმოადგენს გარემოს დაბინძურება, რომელიც აზიანებს ადამიანის ჯანმრთელობას. ჯანდაცვის მსოფლიო ორგანიზაციის მონაცემების მიხედვით (WHO), მსოფლიოში ყოველწლიურად დაბინძურებული ჰაერით 7 მილიონი ადამიანი იღუპება. ჰაერის დაბინძურების მაღალი მაჩვენებლები ყველაზე ხშირად ფიქსირდება დაბალი და საშუალო შემოსავლის მქონე ქვეყნებში. მსოფლიოს მოსახლეობის დაახლოებით 91% სუნთქავს ჰაერს, რომლის დაბინძურების მაჩვენებელი WHO-ს მიერ დადგენილ დასაშვებ ზღვარს სცილდება.

კვლევის მიზანს წარმოადგენდა ჰაერის დაბინძურებისა და ტყვიის მავნე ზემოქმედების შესახებ ცოდნის დონის შეფასება საქართველოს მოსახლეობაში.

საქართველოში 2019 წელს პროექტ "დაიცავი გარემო-Protect Environment"-ის ფარგლებში, რომელსაც ატარებდა ჯანმრთელობის კვლევის კავშირი და დაავადებათა კონტროლისა და საზოგადოებრივი ჯანმრთელობის ცენტრი, ჩატარდა ონლაინ გამოკითხვა Facebook გვერდის დახმარებით, პოსტი შეიცავდა სათაურს, ტექსტს, ბანერს და კითხვარის ბმულს.

სამიზნე პოპულაციას წარმოადგენდა საქართველოს მოსახლეობა, გამოყენებული ენა იყო ქართული.

კვლევა მოიცავდა გარემოს დაბინძურების სხვადასხვა საკითხებს: დაბინძურებული ჰაერით გამოწვეული ჯანმრთელობის პრობლემები, სხვადასხვა გარემოს დამაბინძურებლები (ფოთლების დაწვისას წარმოქმნილი კვამლი, სიგარეტის ნარჩენები, ტყვიით დაბინძურება), პირბადის გამოყენება დაბინძურებული ჰაერის თავიდან აცილების მიზნით და საინფორმაციო საიტის www.air.gov.ge-ის ცნობადობა მოსახლეობაში. კვლევა ჩატარდა 2019 წლის ოქტომბერში, რომელშიც მონაწილეობა მიიღო 349 პირმა. გამოკითხულთა უმეტესობამ (90.3%) სწორად გასცა პასუხი შეკითხვას ჰაერის დაბინძურებით გამოწვეული სხვადასხვა დაავადების შესახებ, ასევე კვლევაში მონაწილეთა უმრავლესობას ჰქონდა სწორი ინფორმაცია ჰაერის დაბინძურებისა და ტყვიის მავნე ზეგავლენის შესახებ (76.8%). კვლე-

ვის შედეგებმა აჩვენა, რომ აუცილებელია მოსახლეობისათვის დეტალური ინფორმაციის მიწოდება საინფორმაციო საიტების შესახებ, სადაც მათ შეუძლიათ გაეცნონ საჭირო ინფორმაციას გარემოს სხვადასხვა დამაბინძურებლების შესახებ, ასევე მათგან თავის დაცვის საშუალებების და სხვადასხვა პრევენციული ღონისძიებების შესახებ, რომლებიც გვეხმარება გარემოს დაბინძურების თავიდან აცილებაში. საქართველოში მწირი ინფორმაცია მოიპოვება მოსახლეობის ინფორმირებულობაზე ჰაერის დაბინძურებისა და ტყვიის მავნე ზემოქმედების შესახებ, სწორედ ამიტომ კვლევის შედეგები შესაძლოა გამოყენებულ იქოს სხვადასხვა საინფორმაციო კამპანიების დაგეგმვისას, რომლებიც ჩატარდება გარემოს დაბინძურების შესახებ მოსახლეობის ცოდნის დონის ასამაღლებლად.

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# RISK FACTORS INFLUENCING HYPERSENSITIVITY TO THE LOCAL ANESTHETIC DRUGS

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Drug-induced hypersensitivity reactions (DHRs) are of major concern due to their frequent severe nature, high rate of hospital admissions and high mortality [1]. They manifest with a wide range of symptoms and signs and can be initiated by a wide range of structurally diverse chemical compounds [2]. The pathophysiological mechanisms underlying hypersensitivity reactions are not well understood, but it is thought that they are immune-mediated [3]. A number of recent studies demonstrated that drug-induced hypersensitivity reactions possess strong genetic predisposition, specifically, different combinations of class I and class II human leukocyte antigens (HLA) and natural killer immunoglobulin-like receptors (KIRs) may be associated with the development of drug allergy [4].

The purpose of the study was to identify risk-factors associated with local anesthetic drug-related hypersensitivity and study combinations of HLA and KIR genotypes influencing the development of drug allergy in an ethnically homogenous Caucasian population.

**Material and methods:** Allergy to anesthetic agents were evaluated by skin tests and venous blood tests for presence of allergen-specific immune globulins type E (IgE) by Enzyme-linked Immunoassay (ELISA). The skin tests were performed for the following local anesthetic groups: lidocaine, mepivacaine, articaine. HLA and KIR typing are performed by PCR using sequence-specific oligonucleotide probes (SSOP). Questionnaire for identification of different risk-factors were filled for all enrolled subjects. The following data were collected: age,

sex, socio-economic status, having allergic mother and/or allergic father, allergy in sibships, drug allergy, latex allergy, food allergy, allergy on cosmetics, allergy on environmental factors, allergic shock in or adverse drug reaction in anamnesis, pregnancy, chronic diseases, infectious diseases.

**Results and discussion.** 450 patients have been included in the study with age range between 4 and 79 years. 230 patients were evaluated by venous blood tests and 220 patients – by skin tests. 257 were females and 193 males. Allergic reactions by different risk-factors are given in the table #1. Allergy to the local anesthetic agent (positive reaction) was present in 37 (%) males and 49 (%) females. 95 patients had allergic mother, from which 28 (%) patients had positive reaction and 67 (%)– negative. 81 patients had allergic father, from which 19 patients had positive reaction and 62 – negative. Allergy in sibships was present in 87 patients, from which 24 patient had positive reaction and 63 – negative. From the subjects with positive reaction the highest proportion (36.0 %) had drug allergy, the next most frequent were food allergy and allergy on environmental factors (30.2% and 27.9%, respectively), 5.8 % had latex allergy and 4.7 % - allergy on cosmetics. 4 patients had a history of allergic shock and 25 - adverse drug reaction. 12 patients were pregnant, chronic diseases were in 19 patients, infectious diseases were in 15 patients, 64.0 % of patients had got the high salary, 47.7 % of patients had specific HLA C1C1 alleles, 19.8 % - KIR 2DL2/2DL2 and 65.1 % - KIR 2DL3/2DL3 alleles.