VOLUME - 11, ISSUE - 05, MAY - 2022 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Health Science

EFFECT OF EXPOSURE OF THE ASBESTOS AND HARMFUL ENVIRONMENT ASSOCIATED WITH IT ON POPULATION HEALTH

Nino Lochoshvili MD, MPH, PhD student, University of Georgia, School of Health Sciences.

George Kamkamidze* MD, MS, PhD, Professor*Corresponding Author

KEYWORDS :

INTRODUCTION

The atmospheric air pollution is the global problem for the world. The effect of the polluted atmospheric air on the human organism is the multifactorial process. It is one of the main causing factors of the morbidity and death rate. According to World Health Organization data, approximately 25% of the death rate and morbidity is related to the environmental factors, however, by preserving the healthy environment it is possible to save lives of 13 000 000 people (WHO, 2018). The polluted atmospheric air is harmful for humans, especially for children. It is the causing and complication factor of the many acute and chronic diseases.

The increase in number of Earth population, increase in scientific-technical progress, the development of urbanization and industrialization processes with rapid rates, increased the demand on energy, food, and other resources (Abos-Herrandiz et al., 2017; ATSDR,2020). The number of world's energy capacities and produced production is increasing, which creates lots of environmental protective problems to the world's urban centers.

In terms of public health, the hard particles of the dust, carbon monoxide, ozone, nitrogen dioxide, sulfur dioxide, asbestos and lead belong to significant contaminants.

Asbestos belongs to fibrous mineral group existing in the nature, which is used in industry. Because of its unique characteristics, such as: stability during tension, low heat conductivity and resistance towards chemical impact. Because of the noted characteristics, it is the unchanged material in industry, domestic, construction and other different activities, the analogue of it has not been discovered up to today throughout the world. The microscopic fibbers of asbestos are found in the air dust in the form of the tiny (invisible) particles, the different serious diseases are developed because of these particles getting into the human body.

Asbestos is acknowledged as dangerous substance for the human life and health, based on the scientific arguments and multi-year observation, asbestos has harmful impact on humanity.

Asbestos is classified by U.S. Department of Health and Human Services (HHS), EPA (Environmental Protection Agency) and the International Agency for Research on Cancer (IARC), as carcinogen working on human body, causes cancer, is known as hidden killer and represents the global threat.

Georgia belongs to the group of countries, who are using and importing the materials, products consisting of asbestos. Product consisting of both amphibolar and chrysolite asbestos are entering in Georgia.

It shall be highlighted that in terms of above discussed subject, lots of problematic issues are existing for Georgia: low interest from society and less political focuses from the side of issue regulating bodies, poor research potential, weak and/or non-existing mechanism for collecting the data, lack of official information sources and badly arranged judicial leverages.

MATERIAL AND METHODS:

Because of the urgency of the issue, the identification of the diseases related to the exposure of asbestos was planned, studying of their distribution and accompanying risk-factors in the asbestos exposed population.

Practical recommendations were developed directed towards minimizing the exposure of asbestos and decreasing the harmful impact of the exposure.

Based on the purpose of the research, the cross-sectional research was performed. For the research instrument, self-administrable questionnaire was created, based on which considering the criteria for participating in the research, the research participants were selected. Based on the content of private information and description of private conditions, received through the questionnaire, the confidentiality of research individuals was protected.

The written information consent form was attached to the questionnaire used in the research, the respondent was going through it individually and signed on it after that.

The purpose of questionnaire was to describe working atmosphere and environment of respondent, working experience in years, risk-factors related to the exposure of asbestos, others environmental factors and the subjects of behavior risk-factors. The risk-groups were separated (experience of working in the asbestos containing environment in years, direct connection to asbestos, frequent morbidity of breathing system, tobacco consumption, accompanying respirational diseases, frequent morbidity with the diseases of different systems, accompanying oncological diseases and etc.).

In the contingent working in the construction field, the risk-groups were revealed and spyrometrial analysis was performed.

While processing the data obtained from the research, the following levels of static analysis was used: univariate, bivariate and multivariate. With univariate analysis, the average and frequency indices were evaluated for each variable research group. In order to determine the connection between dictomial variables correlational analysis was used, the frequency and percentage of indices was defined, the independent variables were separated and crosstabulation was performed.

For bivariate analysis, x^2 (Pearson Chi-Square) test was used, to determine static reliability of the association existing

between the categorical variables and to define the association between the continuous variables Student's t-test was used.

For the multivariate analysis plural logistical regression method was used.

At the phase of planning the research, $p < 0.05$ was defined as statistically authentic (p-credibility level, confidence, probability of the correctness of zero hypothesis at $p < 0.05$). The value for p was calculated for each risk-factor.

In order to evaluate the association existing between the dictomial variables, the correlation of chances was selected (Odds Ratio (OR) with the 95% confidence interval).

Insertion, verification, management and static analysis of the data obtained from the questionnaire and research, was performed by using static parcel IBM SPS Statistics for Windows version 23.0. The obtained data for the analysis are represented in terms of tables and graphs.

Results and their discussion:

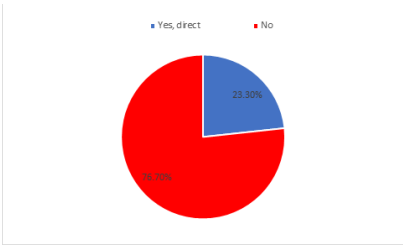
Considering the research design, selection method and size of the sample, 193 employed personnel participated in the research.

The research was conducted at the territory of Georgia, at the base of the 20-construction type institution under the private ownership, particularly in cities Rustavi, Kaspi, Kutaisi and Tbilisi within the period of 2021 year.

People participating in the research based on their working place, were appointed to the following types of construction sites: cement production factory – 45 (23.3%) people, concrete production factory – 49 (25.4%) people, and at construction works – 99 (51%) research people were investigated.

According to the research purposes, on the question from the questionnaire was represented as follows: have you worked for 1 year (or more) at the work, where you had contact with asbestos dust, based on the answers received on this question, the research personnel based on exposure status was separated as asbestos exposure and asbestos non-exposure groups. After the research, the research personnel were appointed as follows: 45 working personnel (23.3%) working in asbestos exposure environment and 148 (76.7%) people not working in asbestos exposure environment. However, according to their reports, based on the description of workplace, they had permanent contact with the materials consisting of asbestos, however, non-direct.

Diagram N°1



Source: (research materials)

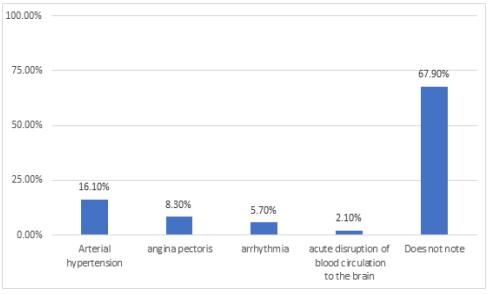
Symptoms and complaints were investigated in respondents subjectively and based on self-evaluation, which can be connected to their working environment.

The difficulty with breathing was mentioned by 33 (17.1%) respondents, panting – by 38 (19.7%) and coughing by 27 (14%), 95 (49,2%) of respondents did not mention existence of any kind of similar symptoms or complaints.

According to research protocol, based on questionnaire, peculiarities of spreading of cardiovascular diseases within the research population was examined, the obtained data are distributed among the subgroup level of the diseases, as follows: the 31 respondents (16.1%) noted morbidity with arterial hypertension, 11 (5.7%) from research personnel noted arrhythmia, 16 (8.3%) respondents has taken over angina pectoris/myocardial heart attack, 4 (2.1%) respondents have taken over acute disruption of blood circulation to the brain, 131 (67.9%) of respondents did not mention about having any kind of disease.

Diagram N°2

Diseases of cardiovascular system



Source: (research materials)

Based on statistics analysis following nosology were defined: arterial hypertension, arrhythmia and angina pectoris/myocardial heart attack, it is twice and even more frequent in asbestos exposure group than non-asbestos exposure group. The difference in the value between asbestos exposure and asbestos non-exposure groups with the noted diseases, is statically confident $p<0.01$. (95% CI=1.466, 5.8221) and the value of correlation of chances is OR=2.9

Different symptoms and complaints regarding breathing system in the asbestos exposure and non-exposure groups, which was examined based on the questionnaire, were revealed with varying frequency. Particularly, difficulty with breathing, panting, and coughing. In the exposure and non-exposure groups the statistically confident difference was depicted $p<0.001$, 95% confidence interval equals to (5.565, 48.12), value for correlation of chances OR - 16.36. Interpretation: in the asbestos exposure group, for the asbestos exposure group, the chances for developing of the different kinds of complaints (panting, difficulty with breathing and coughing) regarding the health system is 16.63 higher than compared to the non-exposure one.

Difficulty with breathing was mentioned by 28.9% of the asbestos exposure personnel, and in the non-exposure group, only 13.5% of the respondents had this noted complaint, almost twice less. The next complaint – panting, for the asbestos exposure group 37.8% of respondents mentioned, and from non-exposure group only 14.2%. The chronic coughing was mentioned by 24.4% of respondents from asbestos exposure group, at the time when only 10.8% of respondents had this complaint from the non-exposure group. The fact that the digestive tract diseases were revealed twice more in the asbestos exposure group, compared to non-exposure one, draws attention as well.

The difference between the frequency of the digestive tract diseases for asbestos exposure and non-exposure groups is statistically confident $p<0.05$ (95% CI=1.391, 7.455) and OR=3.22

Based on the bivariate analysis, lowering in the eyesight was revealed, the difference between exposure and non-exposure groups is confident $p=0.03$, the 95% confidence interval

equals to (1,157;4.636) the value for correlation of chances OR=2,13 (Table N°1)

Characteristics	Non-asbestos exposure	Asbestos exposure	P	OR	CI 95%
Cardiovascular system	34.4%	51.1%	P=0.005	2.9	1.466-5.8221
Complaints of respiratory system	38.5%	91.1%	P<0.05	16.3	5.565-48.12
Eyesight	25.7%	44.4%	p=0.025	2.13	1.157-4.6361
Food digestive tract	16.2%	28.9%	P<0.01	3.22	1.391-7.4551
Covid 19	64.4%	35.8%	P<0.01	3.25	1.619-6.5211

To compare the spirometry data in asbestos exposure and non-exposure groups we have used t-test, for the independent groups. The statistical analysis showed that FVC- forced vital capacity of lungs is different in asbestos exposure and non-exposure groups, between the groups it is statically confident ($p<0.001$). Their average value for whom who were in direct contact with it was revealed to be 4.7098, and for non-exposure group it was 6.0482. Spirometry data shows that for asbestos exposure people it is statistically confident that the vital capacity of the lungs is low – FVC.

Table N°2

Asbestos exposure and non-exposure group		N	Mean	Std. Deviation	Std. Error Mean
FVC	No	148	6.0196	2.60951	.21450
	Direct/yes	45	4.7098	1.90844	.28449
FEV1	No	148	1.9211	1.30896	.10760
	Direct/yes	45	2..4096	1.17238	.17477

Conclusion:

Within the scopes of carried out research, by analyzing the obtained data, obtained reliable results gives opportunity to present following conclusions and recommendations, which we think that in the future will significantly support to increase the health status of people who are employed at high risks containing environments and advocate them.

In terms of exposure towards asbestos, the important environment within the territory of Georgia was identified.

The health condition of people working at the high risks containing environments was examined.

The practical recommendations towards minimizing asbestos exposure and decreasing the harmful impact of the exposure was elaborated.

It was determined that contact with asbestos is independent risk-factor for developing diseases of lung, cardiovascular, food digestive tract and eyesight.

References:

1. ATSDR. (2020). Agency for Toxic Substances and Disease Registry - Toxicological Profile for Glyphosate. U.S. Department of Health and Human Services, August.
2. Abós-Herràndiz, R., et al (2017). Risk Factors of Mortality from All Asbestos-Related Diseases: A Competing Risk Analysis. Canadian Respiratory Journal, 2017.
3. World Health Organization. Public Health & Environment. Global Strategy Overview. 2017
4. WHO | Lead poisoning and health. Factsheet. 2017.