

CERTAIN ISSUES ON OCCUPATIONAL EXPOSURE TO PESTICIDES AND CANCER MORBIDITY IN ARMENIA

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Summary. Case-control study was conducted in rural regions of Armenia with the most intensive arable land cultivation. Patients with malignant tumors of different localization as case group and residents matching by sex, age, place of residence, etc. as control group were selected. Nested study was implemented with analysis of phytotoxic activity of environmental objects. Strong correlation between assortments of pesticides, their amounts and cancer morbidity wasn't revealed, as well as differences in mutagenic burden of environmental objects in case and control groups were not proved. Meanwhile, certain phytotoxic activity was registered in both groups. However, application methods, storage of pesticides, reentering or harvesting periods are considered as factors contributing to development of malignant tumors.

Keywords: case-control study, questionnaire, pesticide, phytotoxic activity, environmental media, cancer disease

НЕКОТОРЫЕ ВОПРОСЫ ПРОФЕССИОНАЛЬНОГО ВОЗДЕЙСТВИЯ ПЕСТИЦИДОВ И ОНКОЛОГИЧЕСКОЙ ЗАБОЛЕВАЕМОСТИ В АРМЕНИИ

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Резюме. Исследование по типу случай-контроль было проведено в сельских районах Армении с высоким уровнем сельскохозяйственного производства. Группа «случай» была сформирована пациентами со злокачественными опухолями разной локализации, группа «контроль» - резидентами, соответствующими группе «случай» по возрасту, полу, месту жительства и др. Были проведены исследования фитотоксической активности объектов окружающей среды. Выраженной корреляции между ассортиментом пестицидов, их количеством и онкологической заболеваемостью выявлено не было, не отмечались также и различия в уровне мутагенной активности объектов окружающей среды в группах «случай» и «контроль». Вместе с тем некоторое повышение фитотоксической активности было зарегистрировано в обеих группах. Однако методы хранения и использования ядохимикатов, сроки сбора урожая и выхода на работу после обработки пестицидами можно считать факторами, влияющими на онкологическую заболеваемость.

Ключевые слова: исследование по типу случай-контроль, опросник, пестициды, фитотоксическая активность, объекты окружающей среды, онкологические заболевания

КЕСИПТИК ПЕСТИЦИДТЕРДИН ТААСИРИ ЖАНА ОНКОЛОГИЯЛЫК МЕНЕН ООРУГАНДАРДЫН АЙРЫМ МАСЕЛЕЛЕРИ

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Корутунду. Армениянын жогору өнүккөн айыл чарба жергесинде изилдөө «иш-контроль» аттуу изилдөө өткөрүлдү. «Иш» тобу ар кандай чектөө шишик менен ооругандар, «контроль» тобуна жаш курагы, жынысы, жашаган жери жана башкалары менен ылайык жашоочулар киргизилген. Айлана-чөйрөнүн объектилеринин фитотоксикалык активдүүлүгүн жүргүзүлдү. Агрехимикаттарды кыркалары менен жана алардын өлчөмү жана рак оорусунун ортосундагы бекем байланыш аныкталган жок. Ошондой эле «иш» жана «контроль» тобтодун арасында айлана-чөйрөнүн объектилеринин мутагендүү активдүүлүгүнүн денгээлдеринде айырмачылыктар жок. Бирок, эки топто тен кээбир фитотоксикалык активдүүлүгү бир аз жогорулагандыгы катталган, топ-топ болуп жазылып калган. Ал эми, агрохимикаттардын сактоо жана пайдалануунун ыкмалары, оруп-жыюу жана пестицидтер менен дарылоодон кийинки жумушка чыгуу мөөнөтү рак оорусунун келип чыгуусуна таасир себеп катары каралышы мүмкүн.

Негизги сөздөр: «иш»-«контроль» изилдөө, анкета, пестицидтер, фитотоксикалык активдүүлүк, айлана-чөйрөнүн объектилерин, онкологиялык ооруу.

Introduction: The issues of possible mutagenic activity of certain pesticide were raised not once. Some pesticides exhibit immunotoxic and genotoxic activities, as well as the impact of pesticides could be expressed by point mutations, increasing chromosomal aberrations in somatic cells and gametes that lead to development of cancer, abortions and perinatal mortality, development of congenital abnormalities, and infertility [1]. Nowadays scientists are linking some malignant tumors to

pesticides' exposure, namely to organochlorine pesticides. As to research data increased risk of breast cancer is correlated with high levels of organochlorine compounds such as DDT, DDE, polychlorinated biphenils in serum and other biological media [2-4]. Pesticides could initiate the development of leukemia, skin melanomas, non-Hodgkin's lymphoma, lung cancer, sarcomas, and prostate cancer. However, opposite information also can be found in scientific literature, as well as suggestions on

the research necessity to clarify the role of pesticides in mentioned issues [5-8].

As to some data, 81 pesticides out of 276 registered in Europe are considering as risk factors of different pathologies. According to classification of pesticides by Environmental Protection Agency of USA 51 pesticides have proved mutagenic activities [9].

Armenia is characterized as country with developed agriculture and both volumes and assortment of pesticides imported is increasing each year. At the same time monitoring and supervising mechanisms in this field are insufficient. As to data obtained in research conducted in Armenia persistent organochlorine compounds (Lindan, DDT) are continually determined in women`s breast milk in significant concentrations [10-12]. Detected levels of DDT and its metabolites, as well as detection frequency are evidence of continually contamination of the environment. Along with this in such situation pollution by organochlorine pesticides might increase mutagenic burden on human organism [13]. Meanwhile researches aimed at revealing the correlation between occupational exposure to pesticides and cancer morbidity were not conducted in Armenia yet.

For this purposes case-control study was designed and focused mainly on regions with high agricultural activities. One of this regions of Armenia is Ararat marz (region) situated in Ararat valley and climatic conditions are contributed both to intensive cultivation of arable lands and application of pesticides [14].

Materials and methods: Information from 2337 medical records of patients from Ararat region was taken from Statistical center of Armenian national center of oncology for period between 2011 and 2014 and included in database for further analysis. For ongoing researches, such as interviews, sampling the environmental and biological media, 756 patients with different localizations of cancer, who hasn't lethal exit at the period of entering record data from 91 villages were pointed.

Only 230 patients from abovementioned persons were found in places for some reasons (i.e. were out of country, died in period between medical cards scrutiny and site visits, refusing to collaborate). Face-to-face interviews by a

specially developed questionnaire were conducted among 230 patients (97 males and 133 females), as well as among 214 residents of Ararat region (84 males and 130 females) that served as control group. Both groups were matched to each other accordingly to certain criteria, such as age, sex, neighborhood proximity and duration of residency.

A nested study was conducted within case and control groups: overall 60 samples of soil and dust were taken from cultivated backyard and house area of respondents. Soil was sampled by envelop method: five portions of soil were taken from the cultivating area (from angles of area and the center), all this portions were mixed and 1/5 part of mixture was taken as a single sample. All samples were coded and analyzed for assessment of phytotoxic activity of soil and dust patterns sampled from abovementioned areas [15]. Tests of phytotoxicity was conducted on *Alium cepa*, *Taraxacum officinale*, *Hordeum vulgare*. Seeds of dandelion (*Taraxacum officinale* Wigg.) were used as test-object that grown on sampled media. Germination of seeds in testing environmental media (samples from case and control groups), as well as the degree of germinating capacity of dandelion seeds were analyzed. Results obtained for both groups were compared with germination of seeds in soil pattern sampled from ecologically clear areas of Armenia (mountainous uncultivated areas, far from settlements) that serves as a control [16-17].

According to the posed aims, the special questionnaire was developed and validated to target groups. The questionnaire includes 54 points on different issues such as indicators of pesticides` impact level, trade names, amounts of pesticides` used in one season, a number of application days, duration of time dealing with pesticides during a year, precautions and specific equipment used by the respondents, methods of application and storage of pesticides, etc.

Results: 117 respondents out of 230 in case group and 105 respondents out of 214 in control group mentioned the periodical application of different pesticides.

There is no statistically significant differences in tillable acreage between case and

control groups (CI 95%, Sig. (two tailed) 0.207).

In case group respondents were more often mentioned application of Karate (Lambda-cyhalotrin) and B58 (Dimethoate) insecticides. The distribution of pesticides applied in both groups was the following: case group - Karate 18%, B58 18%, Arevo 8.8%, Alpak 5.6%, Baleton 5.4%; control - Karate 12.5%, Alpak 10.4%, B58 10.9%, Arevo 6.7%, Baleton 4.8%. Along with this in single cases respondents of both groups have mentioned the application of DDT.

Average number of pesticides' applications per year was ranged between 4 and 5 times in both groups without any significant differences. In studied groups there were approximately half of respondents, whose families are cultivating plants, were not involved in process of pesticides' application (case group - 51%, control group - 52%). In general, only one third of respondents have direct contact with pesticides (case group - 34%, control group - 32%). However, high significant differences in and reentry period duration (time from application of pesticides and agricultural activities in treated areas) were registered between case and control groups (CI 95%, Sig.(2-tailed) 0.000, mean (case) 1.08 day, mean (control) 3.12day).

Results obtained in study of phytotoxicity levels did not show any significant difference between case and control groups neither in soil, nor in dust samples (CI 95% Soil - Sig. (2-tailed) 0.294, Dust - Sig. (2-tailed) 0.344). In the most cases germinating capacity of seeds in testing environmental media was decreased 1.2-1.8 times in comparison with control soil sampled from ecologically clear areas of Armenia. There were separate cases of decreasing germinating capacity up to 2.8 times, that is characterized as moderate phytotoxic activity of studied environmental media.

Significant differences were registered in usage of personal protective equipment (respirators, gloves, special suit, etc) - in control group 25% of respondents have mentioned usage of one or more special individual safety means during application of pesticides, when in case group this number was only 10%. In both groups more often homemade personal

protective means were used rather than special equipment.

As to norms set for storage of pesticides, numerous infringements were registered in case group as well: 44.2% of respondents stored pesticides at their houses in basement with other household equipment and food, 14.2% in barn, 6.7% at cow house, 2.5% at home, and only 31.7% stored pesticides in separate special place. In control group the distribution of mentioned storage place was as following - 22%, 7.2%, 1%, 1% and 67%, respectively. In control group the percentage of respondents storing pesticides in special places far from food, animals were higher.

Conclusion: Strong correlation between assortments of pesticides, applied quantities and cancer morbidity were not revealed. Differences in mutagenic burden of environmental objects between case and control groups were not proved also, but at the same time certain phytotoxic activity was registered in both groups. However, methods of application, storage of pesticides, durations of reentering or harvesting periods are considered as factors contributing to development of malignant tumors.

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ВЛИЯНИЕ ХИМИЧЕСКОГО ФАКТОРА ПРОИЗВОДСТВЕННОЙ СРЕДЫ НА ЗДОРОВЬЕ МЕДИЦИНСКОГО ПЕРСОНАЛА В ОНКОЛОГИЧЕСКОЙ КЛИНИКЕ (обзор)

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Аннотация. В данной работе дается обзор результатов исследований, опубликованных за последние годы, по гигиенической оценке химического фактора производственной среды медицинских работников, работающих с цитостатиками. Приведены сведения, доказывающие опасность загрязнения химическими препаратами воздуха рабочей зоны и рабочих поверхностей. Обоснована необходимость проведения гигиенической оценки условий труда в онкологических клиниках Кыргызстана.

Ключевые слова: медицинские работники, химический фактор риска, рабочая среда, загрязнение, цитостатики.

Онкологиялык бейтапканада саламаттык сактоо кызматкерлеринин ден-соолугуна өндүрүш чөйрөсүнүн химиялык факторлорунун таасири (сереп)

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Корутунду: Макалада цитостатика менен иштеген саламаттык сактоо кызматкерлеринин өндүрүштүк чөйрөсүндө химиялык факторлорду гигиеналык баалоо боюнча жасалган изилдөөлөрдүн акыркы жылдардагы жыйынтыктары берилген. Жумушчу аймактагы абанын химическими препаратами менен булгануу коркунучун далилдеген маалыматтар келтирилген. Кыргызстандагы онкологиялык бейтапканаларда эмгек шарттарын гигиеналык баалоону өткөрүү зарылдыгы негизделген.

Негизги сөздөр: саламаттык сактоо кызматкерлери, химиялык коркунуч, жумушчу аймак, булгануу, цитостатика.

Influence of chemical environment factors on the health of medical staff in the oncology clinic (review)

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Summary. This article provides an overview of the results of studies published in recent years on the hygienic assessment of the working of environment of health professionals working with cytostatics. The data demonstrated the risk of contamination of workplace air and surfaces by cytostatics. The necessity of hygienic assessment of working conditions in oncology clinics in Kyrgyzstan is given.

Keywords: health care workers, chemical risk factor, working environment, pollution, cytostatics.

Введение. Одним из непреложных и обязательных прав человека в нашем государстве является право на здоровье, а также «6.1.1. Право на благоприятные условия труда а) При оказании медицинской помощи работники здравоохранения имеют ряд прав, связанных с достойными, безопасными и здоровыми условиями работы» [1]. Это означает, что «Медицинские и фармацевтические

работники имеют право на условия труда, достаточные и необходимые для исполнения своих трудовых обязанностей без вреда для своего здоровья и жизни. В соответствии с трудовым законодательством Кыргызской Республики безопасные условия труда – это условия труда, при которых воздействие на работающих вредных или опасных производственных факторов исключено либо уровни их воздействия не превышают