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STUDY OF THE EFFECT OF *Rheum ribes* L. PLANT EXTRACT ON HUMAN LUNG CANCER CELLS IN VITRO (A549)

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ИЗУЧЕНИЕ ВЛИЯНИЯ ЭКСТРАКТА *Rheum ribes* L. НА КЛЕТКИ РАКА ЛЕГКИХ ЧЕЛОВЕКА IN VITRO *(A549)*

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Abstract. An extract of *Rheum ribes* L. was isolated and its effect on lung cancer cells (A549) was determined. Cancer is a group of diseases in which malignant tumor cells with the potential to spread and undergo abnormal cell division break away from their original location and invade other parts of the body. According to literature and studies, rhubarb is used as an important medicinal plant. Its medicinal use is due to the presence of anthracene or its derivatives (e.g., anthraquinones) in its composition. The chemical components were isolated and studied. The effective effect of rhubarb extract on cancer cells was determined - there was a decrease in the growth of cancer cells.

Аннотация. Выделен экстракт *Rheum ribes* L., и определено его влияние на клетки рака легких (A549). Рак — это группа заболеваний, при которых злокачественные опухолевые клетки, имеющие потенциал к распространению и аномальному клеточному делению, отрываются от своего первоначального местоположения и проникают в другие части тела. Согласно литературным данным и проведенным исследованиям, ревень используется как важное лекарственное растение. Его лекарственное применение обусловлено наличием в его составе антрацена или его производных (например, антрахиноны). Химические компоненты, были выделены и исследованы. Определено эффективное действие экстракта ревеня на раковые клетки – происходило уменьшение роста раковых клеток.

Keywords: Rheum ribes, plant, flavonoids.

Ключевые слова: Rheum ribes, растение, флавоноиды.

Nature is a source of treatment for a wide range of diseases all over the world. Medicinal plants are a good source of health remedies for the treatment of diseases. Therefore, more recent studies have focused on the use of herbal medicines in the form of natural extracts for the treatment of cancer. Previous studies have shown that these plants have a significant effect on inhibiting the growth and proliferation of gram-positive and negative bacteria, as well as fungi [1, 3, 28].

However, recent studies have shown that rhubarb inhibits the growth and proliferation of cancer cells by inducing cytotoxicity and apoptosis, and inhibiting the cell cycle [32].

Rhubarb *(Rheum ribes* L.) is a well-known medicinal plant widely used in folk medicine. The whole plant *R. ribes* has laxative, diuretic and expectorant properties. The plant is an effective remedy for reducing gastric acidity. Other medicinal properties of this species include a number of properties such as diaphoretic, antiseptic and wound healing. The essential oil in its leaves is effective in the treatment of rheumatism. According to research, the most important secondary

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metabolites of *R.ribes* are phenolic compounds, glycosides, sterols, steroids, resins, alkaloids, flavonoids, fatty acids, coumarins and vitamins. Indeed, due to these diverse compounds, rhubarb has a wide range of pharmaceutical applications [33, 34, 36].

Cancer is one of the leading causes of death worldwide, second only to cardiovascular disease. Cancer begins with a deformed cell that undergoes a genetic mutation in its DNA. These cells multiply uncontrollably, acquire invasive properties and cause changes in the surrounding tissues. Cancer is not just one disease, but a group of about 100 diseases. The disease is characterized by two characteristics: first, the lack of control over the growth of cancer cells, and second, the ability of cancer cells to metastasize and migrate from their original location to different parts of the body. There are two types of tumors: malignant and benign. Age is an important factor in the spread of the disease. That is why this disease is more common in older people. There are many problems (i.e. side effects) associated with solid or hematological cancers such as nausea, vomiting, diarrhea, constipation, hypercalcemia, pain, anorexia, anemia, fatigue, cachexia, leukopenia, neutropenia, and thrombocytopenia. However, the main problems are nausea, vomiting, neutropenia, anemia, thrombocytopenia, and hypercalcemia. Thus, for these reasons, cancer is considered as one of the major diseases that can affect a person's quality of life.

Material and methodology of the study

A study was conducted to examine the effect of plant material collected from the territory of the Nakhchivan Autonomous Republic in 2022-2024 on human lung cancer in vitro. The object of the study was the *Rheum ribes* plant, which is widespread in the Shahbuz region.

The studies were conducted using classical, floristic and systematic methods, as well as a number of modern methods. The life forms of species were determined according to the systems of K. Raunker and I. K. Geobotanical studies are based on the studies of A. P. Shennikova and others and websites were conducted according to. Phenological observations of species by I. D. Yurkevich and the methodologies of other researchers.

Field research is geobotany, floristry, ecological, systematic phenological and modern methods were carried out under the conditions of routes and expeditions. When processing herbarium materials collected in this territory, "Flora of the USSR", "Flora of the Caucasus", "Flora of Azerbaijan" and websites were used (https://www.worldfloraonline.org). When studying the vegetation types of the region, A. S. Ibragimov, L. I. Prilipko, E. M. Gurbanov and M. M. Seyidov works were taken into account [35-39].

Dıscussıon And Results Of The Study

Polygonaceae Juss. The family has more than 800 species belonging to 30 genera distributed throughout the world, mainly in northern regions. The species included in the section are dominated by foliar substances, especially in underground organs, most species are food, ornamental, vitamin and dye plants. There are also weed species. Rhubarb (*Rheum* L.) has simple, large basal leaves and a rosette-shaped inflorescence. The flowers are bisexual or partially male. The petals of the inflorescence are six-lobed, hardening after flowering. There are usually 9(5–10) stamens, 3 stigmas, and a cap-shaped mouth. The fruits are winged triangular nuts [2].

These plants, which were widely distributed in Iran, Turkey and Arabia in ancient times, were used as medicinal and food plants.

In Turkey, the polygonaceae family is represented by eight genera and 70 species. *Rheum ribes* is the only rhubarb species native to Turkey.

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All species in this genus are perennial and include examples such as *Rheum rhaponticum* L., *Rheum palmatum* L., *Rheum officinale* Baill L., *Rheum emodi* L. and *Rheum ribes* L. Most species in this genus are used as food or medicine.

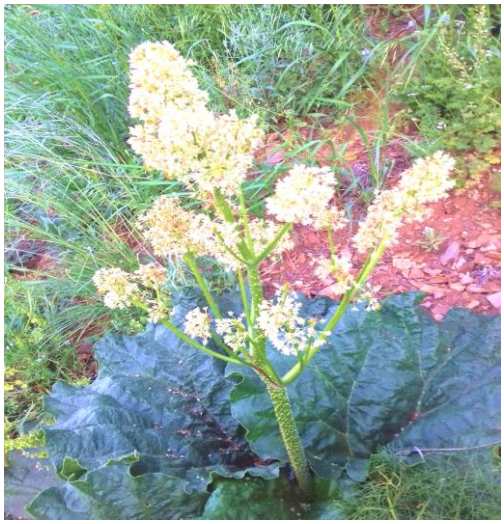

Figure 1. *Rheum ribes*

Its medicinal use is believed to be due to the presence of anthracene or its derivatives such as chemical compounds (e.g. anthraquinones) in its composition. Due to the medicinal uses of these plants, the chemical constituents found in most rhubarb species have been isolated and characterized. Some of these chemicals have been identified as belonging to various classes of phenols, stilbenes and essential oils. Plant species are used in folk medicine for antidiabetic, antispasmodic and digestive purposes. Thick flower stalks are cleaned and eaten raw. Young shoots of the plant are collected by the population in the spring and sold at markets. Pies, pasties, soups, jams, juices, porridges, marmalade, etc. are prepared from the berries. In addition, the shoots are dried and used in the winter.

Nakhchivan has a rich flora, unique climate and geographical location. The vegetation in the region forms diverse groups with a wide variety of grass, shrub and tree species, as well as numerous endemic and rare species.

The ecosystem is dominated by groups formed by different herbaceous plants. These groups are closely related to climate, soil type, water resources and biotic factors. Thus, in the study areas, species included in the genus form groups of different forms with plants belonging to other families [2, 8, 19-23, 28-34].

Regardless of the studied environment, herbaceous plants in all areas closely interact with species of a number of families and form different groups [9-14, 31].

Complex forests and shrubs are ecosystems in which different plant species are found. In these forests, there are complex interactions between herbaceous plants, shrubs and trees. Grasses have a significant impact on the dynamics, structure and functions of these ecosystems. The dominant species in active phytocenoses are legumes, mallows, rosaceae and many other families [4-7, 13, 15-18, 24-27].

Thus, it does not fully reflect the directions of use of species belonging to the above-mentioned genus *Rheum* L.

In our further studies, we consider it appropriate to comprehensively study all the features of the studied species.

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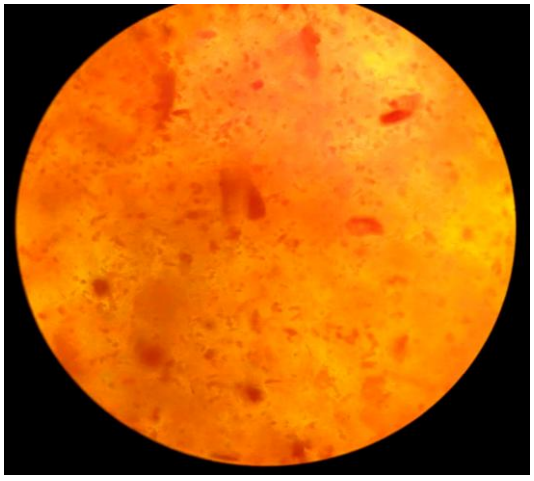
Study of the effect of Rheum ribes plant extract on A549 cells

MTT method 10 ml of DMEM-F12 medium containing 10% FCS was placed in a test tube and 1.105 cells/ml were added. After pipetting the wells, 100 µl of this suspension was placed in each of 48 wells of 96-well microplates. The microplate was incubated at 37°C in an incubator with 5% CO_2 for 48 hours. After 48 hours of coating, polyacrylic acid was added to the wells at different concentrations to test the toxic effect.

Figure 2. CO_2 incubator

Application of extract obtained in lung cancer research. a) Microscopic image obtained after application of a minimal dose of extract from the *Rheum ribes* plant to human lung cancer in vitro.



b) Microscopic image obtained after application of a moderate dose of *Rheum ribes* plant extract to human lung cancer in vitro.

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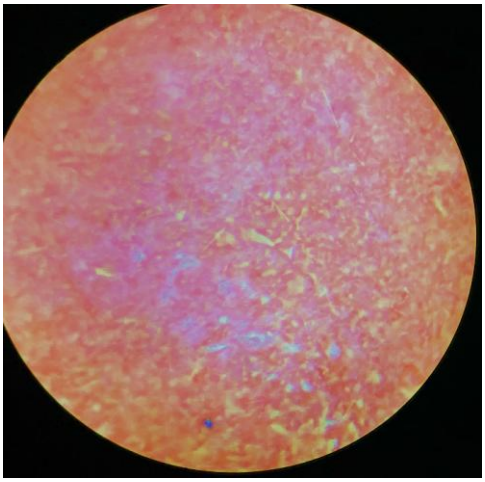
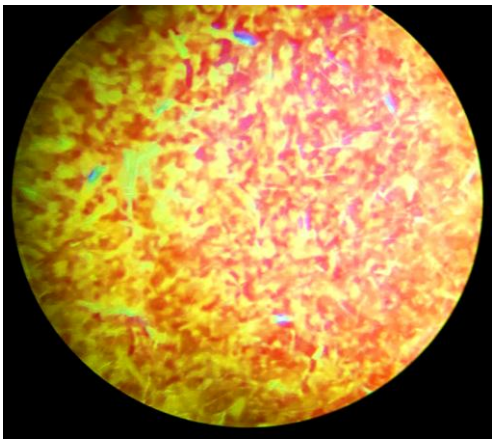


c) Microscopic image obtained after application of the maximum dose of *Rheum ribes* plant extract to human lung cancer in vitro.



d) Control group

Result

For A549 cells: after application of the Rheum ribes plant extract, it was noted that the cells were thinner compared to the control group when exposed to the minimum dose. At higher doses, the extract of sour rhubarb increased the number of cells in the lungs.

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