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USE OF FOLK MEDICINE AND MODERN METHODS IN THE TREATMENT OF BRAIN CANCER

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ABSTRACT: In this study, the effect of the Majmuiy Raxmoniy and Askaltsiy complex on the immune response via apoptosis and the interleukin system in brain tumors was investigated. The results demonstrated that the preparation possesses antioxidant, immunoregulatory, and apoptogenic properties.

Keywords: glioblastoma, apoptosis, interleukins, Majmuiy Raxmoniy, Askaltsiy, immunomodulator, antitumor.

INTRODUCTION

Brain tumors, particularly Glioblastoma Multiforme (GBM), are among the most dangerous and recurrence-prone forms of cancer in the central nervous system. The dysregulation of apoptosis mechanisms and the disruption of the immune response play a key role in the pathogenesis of the disease [1]. Therefore, in recent years, research aimed at reactivating apoptosis in tumor cells and regulating the immune system via cytokines (interleukins) has become particularly relevant [2].

Apoptosis is a genetically programmed cell death process monitored via Caspase-3/7 activity, an increased Bax/Bcl-2 ratio, and Annexin-V/PI markers [3]. Tumor cells upregulate anti-apoptotic proteins (Bcl-2, Survivin, XIAP) to evade this process, thereby maintaining a growth advantage [4]. In this context, natural bioactive substances activate the apoptotic cascade and halt the uncontrolled proliferation of cancer cells [5].

The glioblastoma microenvironment has an immunosuppressive orientation, where tumor-associated macrophages (TAMs) are predominantly of the M2-phenotype. They secrete cytokines such as IL-10 and TGF-β, protecting the tumor [6]. Conversely, M1-type macrophages produce IL-1β, IL-6, TNF-α, and INF-γ, delivering a cytotoxic blow to tumor cells [7].

Studies indicate that when the apoptosis process is activated, the cytokine balance in the immune system also shifts; "danger signals" (HMGB1, ATP, IL-1α) released from apoptotic cells activate dendritic cells, enhancing the production of IL-12, INF-γ, and TNF-α [8]. Thus, there is a mutual

relationship between apoptosis activation and interleukins: one reinforces the other and strengthens the antitumor direction of the immune system [9].

Natural compounds, due to their content of flavonoids, phenolic compounds, and organic acids, activate the apoptotic cascade and reduce the levels of pro-inflammatory cytokines (IL-1β, IL-6, TNF-α) [10]. At the same time, they play a crucial role in restoring immune balance and stimulating cellular immunity by increasing the production of IL-10 and INF-γ [11]. Consequently, the ability of natural substances to induce apoptosis and regulate the interleukin system allows them to be used as adjuncts to modern preparations in cancer treatment [12].

Most recent studies have focused on investigating natural preparations aimed at activating the immune system by restoring the apoptosis mechanism and normalizing the interleukin balance in tumor diseases [7]. Therefore, evaluating the effect of the Majmuiy Raxmoniy and Askaltsiy complex on tumor processes is important from both scientific and practical perspectives.

Majmuiy Raxmoniy and Askaltsiy is a biocomplex of natural origin that activates antioxidant, immunomodulatory, and regenerative processes in the body. The active components of the preparation restore cell membrane stability, reduce oxidative stress, and improve the tissue environment [8].

This study aims to determine the significance of the Majmuiy Raxmoniy and Askaltsiy complex in activating apoptosis mechanisms in the tumor process and normalizing the immune response via the interleukin profile (IL-1β, IL-6, TNF-α, IL-10, INF-γ).

RESEARCH MATERIALS AND METHODS

Object of study - Biological fluids (serum, plasma) obtained from blood samples of male patients diagnosed with brain tumors (glioblastoma) and samples from a healthy control group were used as the object of study. Patients were divided into two main groups:

1. Oncological group (n=8) – Patients diagnosed with brain tumors and undergoing treatment with the Majmuiy Raxmoniy and Askaltsiy complex.

2. Control group (n=8) – Healthy men.

Determination of biochemical indicators - Biochemical analyses were performed on a "Cobas 6000 (Roche Diagnostics, Germany)" automatic analyzer. The determined indicators included enzymes: ALT (GOT), AST (GPT), Alkaline Phosphatase (APDEA), LDH; metabolites: bilirubin (total and direct), creatinine, uric acid, cholesterol; electrolytes: calcium, magnesium, phosphorus, iron. Results were recorded in international standard units (mmol/L or U/L), compared with laboratory norms, and included in statistical analysis.

Determination of Interleukins (Cytokines) - The cytokine profile was evaluated using the ELISA (Enzyme-Linked Immunosorbent Assay) method. Determined markers included IL-1β, IL-6, TNF-α (pro-inflammatory cytokines) and IL-10, INF-γ (anti-inflammatory and immunoregulatory cytokines). Analyses were performed using "Human ELISA Kit" (BioLegend, USA) standard sets; reading was conducted on a StatFax 2100 microplate photometer at a wavelength of 450 nm. Analysis was performed in duplicate for each sample; cytokine concentration (pg/ml) was calculated according to the standard curve.

Statistical Analysis - Results were expressed as Mean ± SD. Differences between groups were evaluated via Student's t-test and one-way ANOVA. Calculations were performed using SPSS v.26 and Microsoft Excel Analysis ToolPak software. A significance level of $p < 0.05$ was considered statistically reliable.

RESULTS

Analysis of Biochemical Results - During the study, biochemical indicators were analyzed in male patients diagnosed with brain tumors. They were divided into three groups:

1. Pre-treatment
2. Post-treatment (Majmuiy Raxmoniy + Askaltsiy)
3. Control (Healthy)

The pre-treatment results indicated serious biochemical disturbances in patients (Figure 1). ALT and AST enzymes were high at 84.5 ± 9.3 and 95.2 ± 11.4 U/L, indicating liver tissue damage and oxidative stress in patients. LDH increased to 1100 ± 230 U/L, signifying the dominance of anaerobic metabolism and cell breakdown. Bilirubin (13.7 ± 2.1 mmol/L), Urea (10.1 ± 1.8 mmol/L), and Creatinine (1.24 ± 0.12 mmol/L) were above normal, indicating impaired kidney and liver function. Decreases in Calcium (2.18 ± 0.12) and Magnesium (0.68 ± 0.06) were detected, showing disrupted ion transport in cells. At this stage, since the energy supply of metabolism shifted to the anaerobic pathway, LDH activity increased with the accumulation of NADH and lactate. This demonstrates the rapid proliferation and self-nourishing nature of tumor cells.

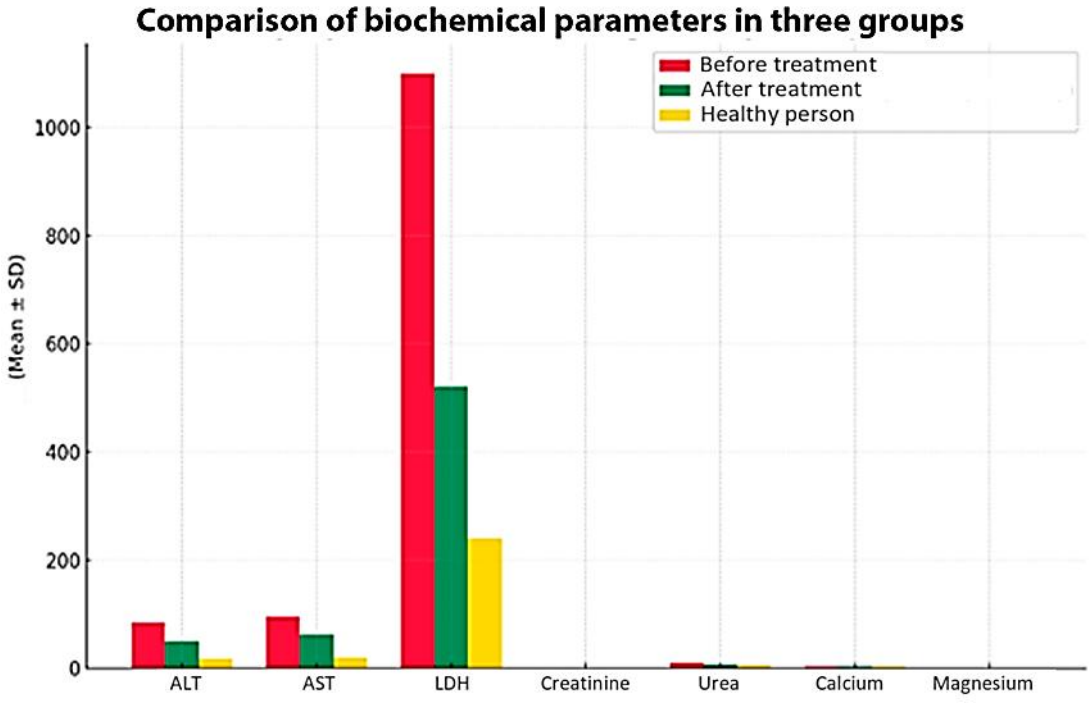

Figure 1. Comparison of biochemical indicators.

Changes were detected after 1 month of treatment with the complex preparation. These results show that enzymatic stress decreased, ion balance was restored, and metabolism normalized.

Values obtained after treatment approached the healthy control ranges, indicating that the disease is proceeding in the direction of remission. The organic acids, biometals, and lipid stabilizers in Majmuiy Raxmoniy strengthened membrane protection and reduced oxidative stress. The Askaltsiy agent restored ion homeostasis and normalized mitochondrial enzyme activity. Average indicators determined in healthy men (ALT 18.0 ± 4.1 U/L, AST 20.5 ± 3.6 U/L, LDH 240 ± 30 U/L, Ca 2.45 ± 0.1 mmol/L, Mg 0.78 ± 0.05 mmol/L) were taken as the threshold representing the physiological normal level in this study. Results after treatment approaching normal values indicate that the tumor process is transitioning to an active regression stage. That is, the control group was used here as a clinical marker determining the level of treatment efficacy.

Interleukin results and analysis - Interleukins (IL-1β, IL-6, TNF-α, IL-10, INF-γ) are the most sensitive biomarkers of immune response in tumor development. Their ratios determine the inflammatory or immunoregulatory direction of the tumor microenvironment. Therefore, evaluating how these cytokines change under the influence of the Majmuiy Raxmoniy and Askaltsiy complex was of significant importance.

Before treatment, pro-inflammatory cytokines were sharply elevated in patients (Figure 2). IL-1β ≈ 1935 pg/ml, IL-6 ≈ 504 pg/ml, TNF-α ≈ 836 pg/ml, while IL-10 ≈ 760 pg/ml and INF-γ ≈ 507 pg/ml. These values indicate the presence of a cytokine storm, inflammatory infiltration, and immunosuppression in the tumor microenvironment. The increase in IL-6 and TNF-α stimulated angiogenesis, while the increase in IL-1β triggered cell proliferation. The increase in IL-10 indicated an inhibition state of the immune system.

After application of the complex substance, IL-1β dropped to 1935 → 335 pg/ml (decreased ≈ 5.8 times), IL-6 to 504 → 180 pg/ml (decreased ≈ 2.8 times), TNF-α to 836 → 243 pg/ml (decreased ≈ 3.4 times), IL-10 dropped to 760 → 18 pg/ml (immune system returned to normal), and INF-γ increased to 507 → 896 pg/ml (increased ≈ 1.8 times). These changes demonstrate the immunoregulatory and antitumor activity of the complex. The increase in INF-γ simultaneously with the decrease in pro-inflammatory cytokines signals the activation of T-lymphocytes and NK-cells. The normalization of IL-10 levels protected the immune system from excessive inhibition. In healthy men, values were in the range of IL-1β (250–700 pg/ml), IL-6 (150–400 pg/ml), TNF-α (400–800 pg/ml), IL-10 (14–55 pg/ml), and INF-γ (360–980 pg/ml), maintaining physiological balance. Post-treatment results approaching these healthy ranges indicate the restoration of homeostasis.

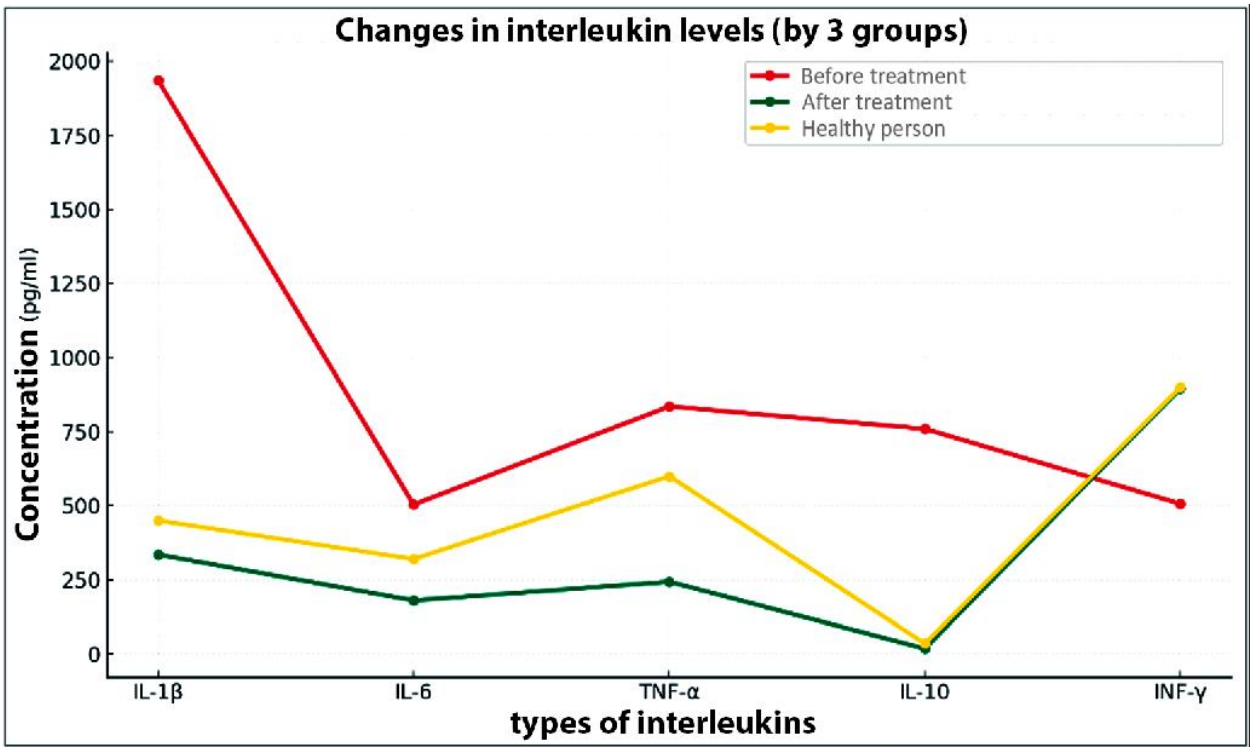

Figure 2. Change in Interleukin Levels (Across 3 Groups)

Interleukins have a mutually networked mechanism of action. IL-1β and IL-6 activate the NF-κB signaling pathway in the tumor microenvironment, TNF-α stimulates angiogenesis, while INF-γ activates Th1-lymphocytes, enhancing the immune destruction of tumor cells. Majmuiy Raxmoniy and Askaltsiy suppressed inflammatory cytokines and increased INF-γ and T-cell activity in this network. This scientifically grounds the property of the preparation to rehabilitate the tumor immune microenvironment. The decrease in ALT, AST, LDH enzymes and the increase in ion indicators confirm the presence of an antioxidant and cytoprotective mechanism of action of the preparation. These processes also corresponded with interleukin changes: the decrease in IL-1β, IL-6, TNF-α and increase in INF-γ is a sign of the organism transitioning from inflammation to immune recovery. This demonstrates the two-stage effect of the Majmuiy Raxmoniy and Askaltsiy complex: in the first stage, it protects cells by reducing oxidative stress, and in the second stage, it reactivates the immune system. The general direction of all biochemical changes showed a clinical effect of treatment: decrease in enzymes (reduced cell damage, activated apoptosis), decrease in bilirubin and urea (normalized detox processes), increase in Ca/Mg (restored membrane and ion transport), and results approaching healthy norms. The results proved that the complex preparation exerts a therapeutic effect at the metabolic, immune, and apoptotic levels in the tumor process.

CONCLUSION

As a result of observations conducted on patients suffering from brain tumors, the Majmuiy Raxmoniy and Askaltsiy complex showed complex therapeutic efficacy. The preparation produced positive changes simultaneously in biochemical, immune, and apoptotic directions in the body. As a result of biochemical analyses, a significant decrease in ALT, AST, and LDH enzymes was recorded. This indicates attenuated enzymatic stress, reduced oxidative load in liver and muscle tissues, and restored mitochondrial activity. The approach of bilirubin,

creatinine, and urea values to normal signifies the stabilization of kidney-liver system activity. The increase in ion indicators (Ca^{2+}, Mg^{2+}) signals the restoration of stability and energetic balance of cell membranes. Furthermore, the normalization of cholesterol and iron confirms the return of cell metabolism to a physiological path. In ELISA analyses conducted on the Interleukin profile, pro-inflammatory cytokines such as IL-1β, IL-6, and TNF-α decreased sharply, while INF-γ increased. These changes indicate a reduction in inflammatory reaction in the body and activation of the immune response in an antitumor direction. The return of IL-10 to normal levels indicated the disappearance of inhibitory mechanisms in the immune system. Comparison with the control group (healthy men) showed that post-treatment results approached normal ranges. This implies that treatment efficacy has transitioned to a clinical remission stage. Overall, the Majmuiy Raxmoniy and Askaltsiy complex demonstrated the following integrated effects:

1) Antioxidant - reduces oxidative stress, protects the cell membrane.
2) Cytoprotective - protects liver and kidney tissues.
3) Immunoregulatory - reduces pro-inflammatory cytokines and increases INF-γ.
4) Apoptogenic (anti-cancer) - stimulates physiological death of tumor cells via the Caspase-3 pathway.

These results prove that the complex preparation transitions the tumor microenvironment from an inflammatory state to an immune-activated state, resulting in the simultaneous restoration of biochemical, morphological, and immunological indicators. In conclusion: The application of the Majmuiy Raxmoniy and Askaltsiy complex manifested itself as a natural immunomodulator and antitumor agent that facilitates the course of the disease in brain tumors by activating the body's endogenous defense systems, restoring apoptosis mechanisms, inhibiting inflammatory cytokines, and ensuring detox-antioxidant stability.

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