

Estimation of Naturally Modified Mineral Water Protection Activity Against Experimental Infections

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Abstract: An estimation of protective efficiency of naturally modified mineral water (BAE Synergy Liquid preparation) was performed on animals in models of flue and anthrax infections. The preparation exhibited a significant effect as a preventive and therapeutic agent at these infections.

Key words: Anthrax, flue, protection activity, immune system, BAE synergy liquid, white mice

INTRODUCTION

At the present stage of civilization development the infectious diseases (ID) remain as one of the significant problems of infectology and epidemiology. According to literature, epidemiological flashes of infections are registered first of all in developing countries with unstable social and economic conditions.

In developed countries their prevalence is limited. According to the opinion of some researchers, in the near future the epidemics should be expected of yellow fever on the Asian continent, as well as new pandemic of flu on the basis of recombinant bird's strain virus, new pandemic of smallpox caused by transmissible variant of Monkeypox, or spreading of Ebola type air-born virus.

A danger of bioterrorism should not be excluded with usage, as the most probable biological causative agents, of such ID as plague, anthrax, hemorrhagic dengue fevers, Ebola, Machupo, Marburg, Venezuelan encephalomyelitis of horses, natural smallpox, etc^[1].

The most effective therapeutic agents for ID prevention are immunobiological preparations (vaccines). However, immunobiological preparations are effective only for a limited number of infections.

Moreover, high percent of mixed infections makes hardly achievable the problem of creation of specific immunization preparations against each possible agents. The introduction of whey appears effective only at early stages of infectious process. Besides, vaccines may suppress the organism resistibility to infections in certain phases of the immune process.

The efficiency of antibacterial preparations decreases when the number of agents with multiple stability to antimicrobial remedy vastly increases, the part of associate infections enlarges, and aggression of opportunistic pathogenic flora rises. This reduces the role of the preparations in prevention of epidemics. Therefore, the optimization of only etiotropic therapies does not fully solve the problem.

Immuneoriented, pathogenetic, symptomatic, and other new types of preparations are thus added to earlier developed schemes to improve the principles and ways of ID prevention and therapy.

In this connection natural preparations seem extremely promising which strengthen the functional condition of immune system and, thereby, activate protective forces of macroorganism. One of such preparations is BAE Synergy Liquid (BAE SL). This preparation represents mineral water which was underwent subtle energetic changes at the natural energetic deposit in Malaysia. According to developers, it stimulates metabolic processes, raises physical activity and work efficiency of people, and also exhibits an antimicrobial action in *in vitro* experiments^[2-4].

We study the efficiency of the preparation in protection against some ID in *in vivo* experiments.

MATERIALS AND METHODS

The object under study was the BAE SL preparation representing a water solution of a complex of microelements (silicon, aluminium, magnesium, calcium, iron, manganese, nickel, the titan, chrome, copper, silver, zinc, strontium, sodium, chlorine, sulphate-ion)

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which was activated by a special energetic source providing it with the natural energetic deposit in Malaysia. The preparation was tested on animals in 1:100 water solution, and the animals drank it freely from drinking bowls.

The study was conducted on 170 white outbred mice-males with a weight of 18-20 grams obtained from Rappolovo nursery of the Russian Academy of Medical Sciences. All mice were on one-week quarantine before the beginning of experiment.

For modeling anthrax infection, B.anthraxis (71/12 strain) of the second Cenkovsky vaccines has been used. The culture agent was cultivated on casein agar under 37°C for 2 days. The suspension of the agent was injected to animals once hypodermically in 0,5 ml volume. The contaminating dose was 1 LD₅₀, which is 50% of mice lethal dose corresponding to 6.6 spores per mouse.

For modeling flu infection, A/Aichi/2/68 (H3N2) flu virus was used. The suspension of the agent was injected to animals once hypodermically in 0,5 ml. volume with contaminating dose equal 3,5 LD₅₀. The LD₅₀ value for each agent was calculated on white outbred mice by the Kerber method with modifications by I. P. Ashmarin and A. A. Vorobiev.

The animals were monitored during 14 days after infection, and survived and fallen mice were counted daily. The protection effectiveness of the BAE SL preparation solution was estimated by comparing the survival rates in the experimental group versus the control group. The percent of survived animals in the experimental and control groups was calculated by V. S. Genesa's tables^[5].

To reveal the significance of the obtained results, the statistical analysis was performed. Because the samples differed from each other by categories alive or dead, nonparametric criteria were used. The Chi-square test, Wald-Wolfowitz Runs test and Mann-Whitney U test were applied. The analysis was done with the help of Statistica program.

RESULTS

Two series of experiments were carried out. The first one concerned the study of the preparation in the experimental model of anthrax infection.

Anthrax infection: The experiments were conducted on 80 white outbred mice-males with a weight of 18-20 grams. The animals were preliminary divided in two groups, experimental and control, 40 animals each.

Animals of the experimental group received the investigated preparation during 15 days before

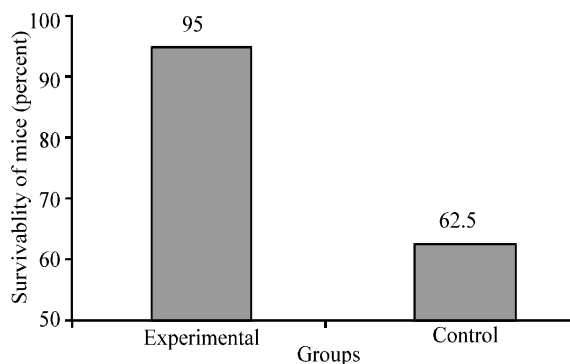


Fig. 1: Protective effect of BAE SL preparation with respect to experimental anthrax infection

contamination. Animals of the control group drank water without the preparation.

Investigated preparation presents BAE SL preparation diluted in 1:100 proportion with drinking water.

As a result of the research it was revealed that the survival rate in the control group was 62,5 % (25 mice survived from total 40) at the end of monitoring (14 days after infection). The survival rate in the experimental group, in which animals took the preparation together with potable water, was 95 % (37 survived individuals from total 39) (Fig.1).

After receiving the positive effect from the BAE SL preparation application in the experimental model of the ID with bacterial nature, it was interesting to estimate its efficiency on diseases of virus nature as well. That was done in the next series of experiments, which were carried out in the experimental model of such widespread disease as flu.

Flue virus: Research was conducted on 90 white outbred mice-males weighted 18-20 grams, preliminary divided on three equal groups, 30 mice each.

Animals of two experimental groups took investigated preparation (drank independently from drinking bowls). Thus mice of first experimental group took an investigated preparation before and after contamination (group 1), and animals of the second experimental group took an investigated preparation only after contamination (group 2). Animals of control group (group 3) took drinking water without an addition of a preparation both before, and after contamination.

As a result of the conducted researches it has been revealed, that in experimental group 1 the percent of the survived animals has made 50 % (survived 15 mice from 30) at the end of monitoring for contaminated mice (14 days after infection); in experimental group 2 the value of an estimated parameter has made 35 %

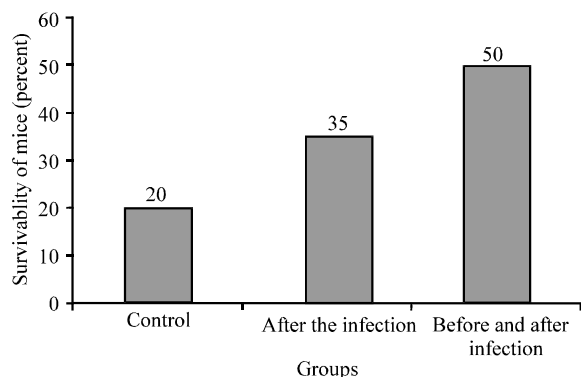


Fig. 2: The protection effectiveness of BAE SL preparation solution against experimental A type flu virus

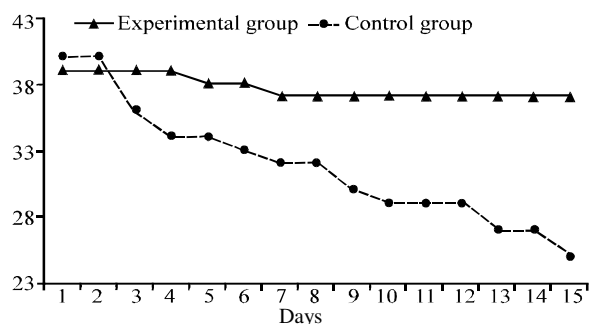


Fig. 3: The lethality dynamics for two groups of mice infected by the anthrax agent

(survived 11 mice from 30); and in the control group (group 3) survival rate has made 20 % (survived 6 individuals from 30) (Fig.2, Table. 2).

DISCUSSION

Anthrax infection: The significant efficiency of the preparation related to the experimental anthrax infections was also traced in the lethality dynamics of infected animals in the experimental and control groups (Fig. 3).

It should be noted that the main loss of infected animals in the experimental group was registered on 5–7 days after contamination. Afterwards there was no loss of remained mice until the end of the monitoring time. In contrast, the loss of infected mice in the control group had a form of monotonously decreasing function. The average lethality speed in the control group was 1 mouse per day.

For obtained experimental data the significance of difference between the experimental and control groups

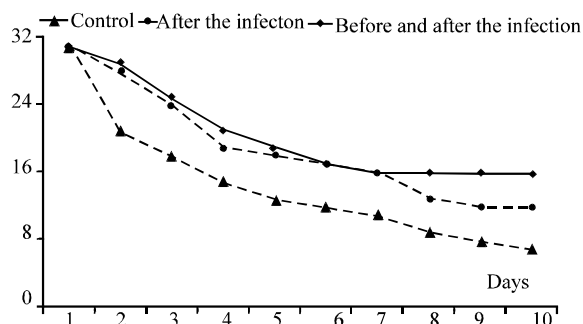


Fig. 4: The lethality dynamics for animals infected by the A type flu virus

is very essential (Table 1). The probability that the difference is due to a random effect is less than 0.1 % ($p=0.0005$).

Flue virus: At an estimation of the results describing lethality dynamics of infected animals, it has appeared (fig. 4), that in the first 7 days after contamination the difference in lethality dynamics between the investigated groups was not significant. Later on, the fall of animals in group 1 was stopped, while animals of group 2 continued to fall, but less intensively, relative to the control group.

Statistical processing of the results obtained during the estimation of efficiency of the investigated preparation concerning an experimental flu infection, shows, that statistically significant difference with the control group by the mice survival rate parameters have been revealed only in the regime of use the preparation before and after contamination (tab. 3). The use of BAE SL only after contamination has not given statistically significant difference between the experimental (group 2) and control groups (tab. 4) by the survival rate parameter.

The summation of the received results testifies that studied BAE SL preparation has the certain protective action concerning to the experimental flue and anthrax infections.

On the model of experimental anthrax infection was shown, that the preventive application the investigated preparation essentially stimulated resistance of macroorganism to the vaccinal strain of the anthrax, possessed of residual virulence for the mice - in the control group 37,5 % of animals have fallen (15 individuals from 40), in the experimental group the lethality values was only 5 % (2 individuals from 39).

Practically the similar results have been obtained at an estimation of efficiency of the investigated preparation concerning the experimental A type flue

virus. However, it is necessary to note, that the best results of the protection were revealed under taking BAE SL preparation before and after contamination. In this case it was possible to reach 50 % of survival rate of mice infected by the A type flu virus with a dose 3,5 LD₅₀ against a background of 20 % of survival rate in the control group.

Less effective use of BAE SL was in the case of only after flue infection consumption regime. In this case of use investigated preparation the increasing of survival rate of the contaminated animals on 15 % in comparison with the control group was also promoted, however this increase was statistically not significant.

The obtained results of research testify to a basic opportunity of BAE SL preparation application as a means of increase the resistance of an organism to anthrax and flue infections. At the same time it is necessary to note, that these results have preliminary character. In case of their confirmation it is represented of advisable to continue research with the given preparation, paid special attention to the questions of studying of possible mechanisms of ones protective action.

CONCLUSIONS

- Application of BAE SL preparation promotes increase a resistance of experimental animals to the infections with activators like anthrax and A type flu viruses.
- Preventive use of BAE SL preparation for the experimental animals during 15 days up to contamination of an anthrax vaccinal strain possessing with residual virulence for mice, promoted increase of their survival rate in 7,5 times in comparison to the control.

- BAE SL preparation is most effective concerning an experimental flue virus in case of its use in the regime of consumption “before and after” contamination with an A type flu virus. At the same time the survival rate of the contaminated animals increased in 2,5 times in comparison to the control.

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