USE OF THE HIGH-MOUNTAINOUS CLIMATE FOR TREATMENT OF PATIENTS WITH DEPRESSION OF BLOOD

(The historical information)

A.R. Raimjanov, S.G. Astapova, I.A. Tsopova, M.O. Eralieva

Kyrgyz Scientific Center of Hematology, Bishkek, Kyrgyz Republic

Treatment of patients with depression of blood in Kyrgyzstan is a very important problem, and also in a lot of other countries that have no opportunity to conduct a full medical treatment of these diseases, without mentioning the procedure of the bone marrow transplantation. Taking into consideration these circumstances, the Kyrgyz scientists (Mirrakhimov M.M 1977, Raimjanov A. P 1988, 2002) suggested the high-altitude climate treatment (Tuya-Ashu Pass, 3200 meters above the sea level) as an alternative method of treatment of nosology. According to Raimjanova A.P (2002) the single and, especially, the repeated courses of treatment in condition of the mountain climate promote the significant decrease of manifestations of anemic and hemorrhagic syndromes of patients with AA and ITP, mitigation of the disease course, prolongation of the remission duration and consistent stabilization of the hematologic indices. In the process of the mountain climate treatment the stimulation of all germs of hematopoiesis, the correction of hemostasis, positive shifts of the immune status, the adrenal cortex and other dynamic changes take place in the organs and body systems. According to the research conducted by our countrymen, the high altitude climate has a great influence on the immune system, regulated by the very large number of humoral mediators (11). Among them cytokines – the low molecular weight protein molecules providing the processes of intercellular communication that have a significant effect on hemostasis being the most vulnerable link of the patients with depression of hematopoiesis by suppressing it or stimulating take the special place.

The history of high-climatotherapy (HC) begins in 60-th years of the last century. In the hospital treated patients from 70 cities and regions of the former Soviet Union, including the Institute of Hematology of Moscow, Leningrad, the Ukraine, Belarus, Moldova, Uzbekistan and others. The big research work on studying of mechanisms of influence of factors of high mountains at organism of the healthy and patients with aplastic anemia, idiopathic thrombocytopenic purpura, a disease of Marchiafava-Mikkeli, iron deficiency anemia, asthma, etc. was conduct.

The methodology of the mountain health treatment

The background research is conducted in Bishkek (760 m). If there are no contraindications to stay in the high altitude, the patients, accompanied by a doctor and nurse on the special auto transported to the high-mountainous hospital (Tuya-Ashu Pass, 3200 m). They are accompanied

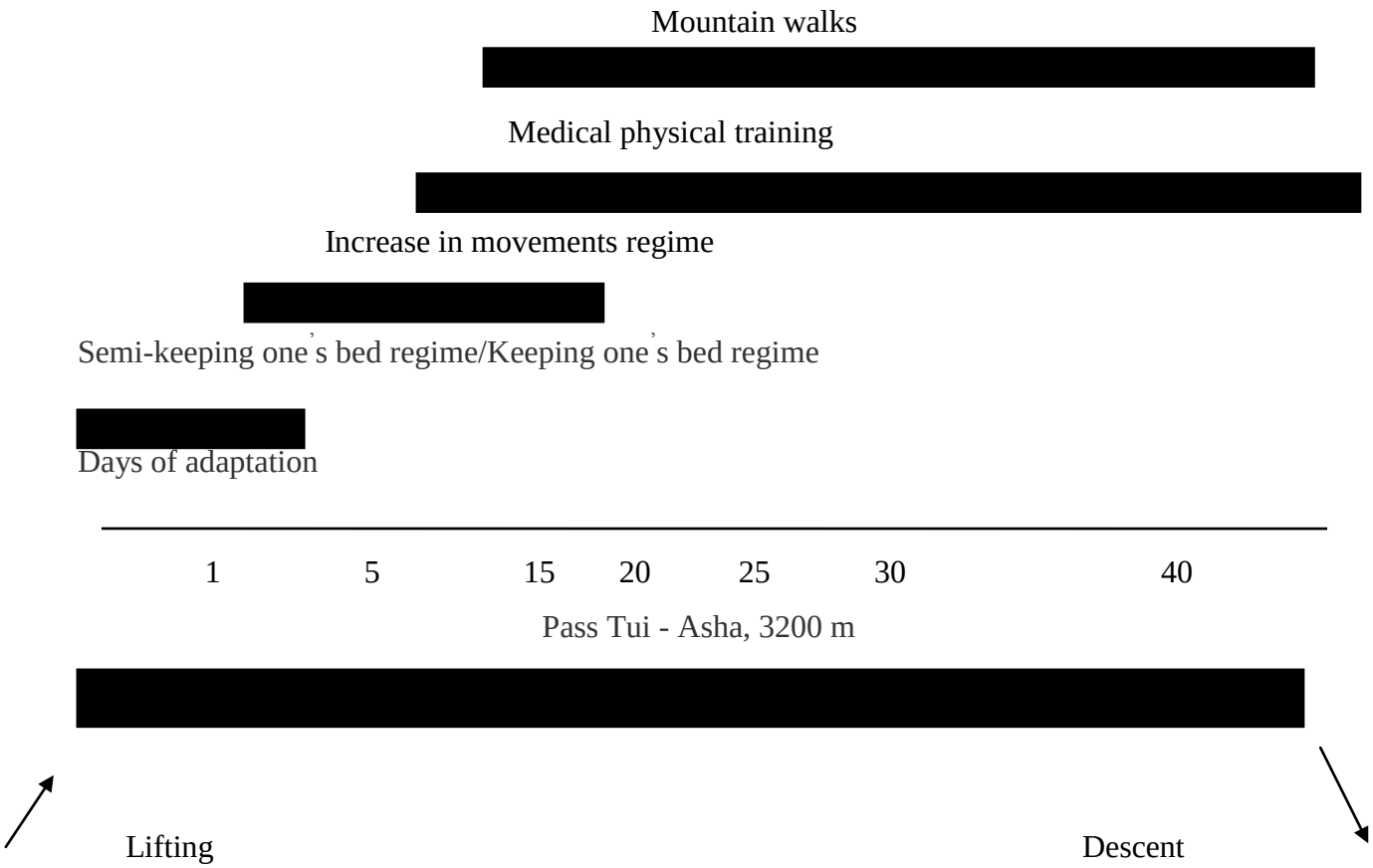
by the doctor and nurse. Along the line 2-3 times are spent a short-term stop, and the doctor checks a condition of patients.

After arrival at the mountain hospital for patients assigned keeping one's bed regime at the 3-5 days for simplification of a current of mountainsickness. Starting with 3-5 days (individually) walks on hospital territory are recommended. After 8-10 days the treatment added the respiratory gymnastics and medical physical training. Then - climbing on a specially designed route, under medical supervision. During the day, patients play tennis, billiards, chess, listen to music, watch movies and TV shows, organize contests of amateur, etc.

The patients are observed by the doctor, researches of blood and bone marrow at various stages of adaptation are carried out. Researches of indicators of ventilation of lungs, kardio - and haemodynamics do if it is necessary Patients are provided with adequate nutrition. But the number of calories per day increased by 50%, to appoint additional vitamins and minerals. Drug therapy should be only on the strict condition.

After 40-day mountain treatment, patients down in Bishkek. They conducted a comprehensive final examination. The received data is processed and each patient is given specific recommendations.

Scheme of the high-climatotherapy



Research methods that were used in the 1960 - 1990 years:

1. Blood count with platelets and reticulocytes

2. Acid erythrogram (A.I. Vorobiev, 1960)

3. Fetal hemoglobin (Betke et al., 1958)

4. Erythropoietin (Cotes, Bangham, 1961)

5. Serum iron, total and latent iron-binding capacity of serum transferrin saturation percentage (Henri, 1958)

6. Serum ferritin by radioimmunoassay (F. Addison et al., 1972)

7. Bone marrow by counting the number of myelo- and megakariocyts, making partial normogramm (I.A. Kassirskiy, G.A. Alekseev, 1970)

8. Autoradiography of the bone marrow with the labeling of H-thymidine incorporation (in vitro) in erythroid cells (G.I. Kozinets, 1963)

9. Threpanobiopsy (M. Abramov, 1960)

10. Interferometry erythrocytes (I.A Bykov et al., 1993)

11. PAS-reaction

12. Scanning electron microscopy of blood cells

13. Transmission microscopy of bone marrow erythroid cells (G.I. Kozinets, 1970)

14. Fibroblast Culture (A.J .Friedenstein et al., 1970)

15. Cortisol in serum of blood of radioimun method

16. 17-hydroxycorticosteroids in plasma (K.V. Druzhinin, 1965)

17. Urinary metabolites of 17-ketosteroids by chromatography (M.A. Krehova, 1968)

18. Determination of T-active lymphocytes, T-helper and T-suppressor cells (Wybran et al., 1972; Palutke et al.; 1969, Kedar et al., 1974)

19. Unit-gemagglyutatsionnaya test, sucrose test, test Khem, Coombs' reaction, hemosiderin urine (L.I. Idelson, 1968)

As a result of researches the conclusion is drawn:

40-day adaptation caused improvement of differentiation and proliferation of bone marrow erythroid cells. In the peripheral blood revealed a positive trend confirmed:

1. Shifts acid erythrogram right. That was a significant development of the younger - Ultra long erythrocyte-rich fetal hemoglobin.

2. Process improvement gemoglobinizatsii erythrocytes. This indicates an increase in the proportion of red blood cells with a dry weight of 20-29 m and 30-40 m, they are higher than those in the foothills of 31% and 59.2%, respectively.

3. Decreased by 3 times PAS-positive erythroid cells of the bone marrow as compared with those in the foothills. This points to a decrease in the degree of ineffective erythropoiesis, 4.5 times faster maturation basophilic normoblasts polychromatic.

4. Increased proliferative activity of erythroid nucleated bone marrow cells. In the 3.8 - 3.1-fold increased labeling index of H3-thymidine pronormoblastah, basophilic and polychromatic

erythroblasts.

5. Improved picture of trepanobiopta in early and late periods after the mountain climatic treatment.

6. According to the electron microscopic study - increased by 1.8 times the proportion of normal biconcave red blood cells and reduces the number of red blood cells in the form of mulberry, deflated ball, spherical, destructive or degenerative change of form. The cellular surface eritro - and normoblasts becomes more equal. Earlier it reminded a maple leaf, vials or hand fingers. The perinuclear spaces are decreased. Destructive changes in the mitochondria are degreed.

7. As a result of positive changes of bone marrow cells, decreases the degree of hemorrhagic syndrome. 3 times increase in the number of patients with platelet counts of 70 to $100x10^9$/l.

8. To study the function of the adrenal cortex in patients with depression blood reliably. A 52% increase in serum cortisol. It speaks about immunosuppressive effects of own glucocorticoids for a disease current.

Today the study of mechanisms of influence of mountain climate for the patients with depression of blood has a new phase. Scientific staff of KSCH conducted studies of growth factors, cytokines, platelet count, etc. It is necessary for understanding of illunology pathogenesis mechanisms at patients with depression of blood, and for prognosis of effective of treatment.

They showed that:

1. The level of hypoxia-inducible factor (HIF) at patients with aplastic anemia (AA) and idiopathic thrombocytopenic purpura (ITP) was originally raised. Maximum values are defined on the 3-5^{th} day stay in the high hospital. But, by the 40^{th} day, by the end of the period of adjustment to hypoxia, HIF values have decreased in both groups. Perhaps, by this time HIF stimulated of EPO synthesis, which increases the production of red blood cells and hemoglobin.

2. Hypoxic hypoxia has a stabilizing effect on the cytokine profile (interleukin-2, 6, tumor necrosis factor) for patients with depression of hematopoiesis.

3. At patients with AA and ITP increases platelet count from his first days in the mountains. By the end they stay in the mountains, it was significantly increased by 2.5 times. On the 40th day mountain climatotherapy improved aggregation of platelets. % Increase light transmission with inducers of aggregation, size increases of platelets agregant. In trombotsitogramme increases the number of mature, physiologically active form of platelets.

4. Positive changes in the studied parameters at patients with AA and ITP after high-climatotherapy stored up to 3 months after descent.