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STUDY OF BLOOD ANALYSIS OF FIRST-YEAR INDIAN STUDENTS UPON ARRIVAL IN KYRGYZSTAN (BISHKEK)

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ИЗУЧЕНИЕ АНАЛИЗА КРОВИ ИНДИЙСКИХ СТУДЕНТОВ-ПЕРВОКУРСНИКОВ ПО ПРИБЫТИИ В КЫРГЫЗСТАН (г. БИШКЕК)

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Abstract. Our study focuses on the analysis of red blood cells and leukocyte formula indicators in foreign students from India upon their arrival in Kyrgyzstan. Based on the leukocyte formula results, during the short-term adaptation phase, no tendencies of overexertion or disruptions in the adaptation mechanism were observed among both male and female Indian students. Furthermore, there was no observed decline in health levels or the onset of acute and chronic diseases during this period. The resilience of the body to stress reactions under different socio-climatic conditions showed that the general blood analysis parameters for these students remained within the bounds of stable homeostasis, determined by their individual potential.

Аннотация. Подготовленная нами статья посвящена изучению анализа красной крови и показателей лейкоцитарной формулы иностранных студентов из Индии по прибытии в Кыргызстан. По результатам лейкоцитарной формулы, при кратковременной адаптации у иностранных студентов: юношей и девушек индусов, тенденции перенапряжения и срывов механизма адаптации не отмечается. За период кратковременной адаптации, также не были отмечены снижение уровня здоровья и развитие острых и хронических заболеваний. Устойчивость организма на реакцию «стресс» при краткосрочном привыкании в иных социально-климатических условиях у иностранных студентов как юношей, так и девушек, параметры общего анализа крови выражались в пределах устойчивого гомеостаза, закрепленного индивидуальным потенциалом.

Keywords: short-term adaptation, blood, leukocyte formula, stress, homeostasis.

Ключевые слова: кратковременная адаптация, кровь, лейкоцитарная формула, стресс, гомеостаз.

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Every year, international students come to study at the Kyrgyz-Russian Slavic University and other national higher education institutions, such as the Kyrgyz State Medical Academy (Bishkek) from CIS countries, as well as from other foreign countries — India, Pakistan, Iran, Syria, Arab countries. Upon arrival in a different country, all international students face the challenge of adapting and integrating into a new social and educational environment, where school lessons are replaced with unfamiliar classroom lessons for all freshmen, and lecture-seminar delivery of material. Social adaptation for each international student, especially from India and Arab countries, takes place in a new socio-cultural reality and is not without problems. Teachers, especially of the introductory courses, are concerned about the insufficient knowledge of the Russian language and the complete lack of preparation for specialized subjects. Whereas local high school graduates, as well as older applicants, take specialized subjects for the "National Testing" (NT), which has been held in Kyrgyzstan since 2002 and is one of the largest anti-corruption projects in the field of education aimed at conducting objective, transparent testing of graduates and ensuring a transparent, fair admission process to higher education institutions [1].

The scientific work we prepared is related to the short-term adaptation within 2-3 weeks after the arrival of foreign students to study at the Kyrgyz-Russian Slavic University. At the KRSU clinic, medical cards of foreign first-year students were studied after the annual routine examination. The age of the examined young men ranged from 17 to 25 years; blood tests were conducted in the laboratory (AQUA Lab). We studied some parameters of the general blood analysis and the leukocyte formula of first-year Hindu students. The research results consisted of 50 medical cards of female students and 62 cards of male Hindu students. The collected data from the analyses were processed using the SPSS Statistics software and are presented in Tables 1–4.

Table 1

BLOOD ANALYSIS PARAMETERS IN INDIAN GIRLS

Name of values	*Erythrocytes (or Red Blood Cells 10^{12}/L*	*Hemoglobin g/L*	*CI, Color Index*	*(ESR), Erythrocyte Sedimentation Rate mm/hour*
1. Standard	3.9–4.7	120–140	0.8–1.0	2–15
2. Maximum	4.4	141	1	18
3. Minimum	3.2	102	0.8	5
4. MODE (most frequent value)	4.0	120	0.9	8
5. Average value or Mean value	3.99	120.18	0.9	9.68

Upon arrival in Kyrgyzstan, international students from abroad undergo a medical examination in the first few months of attending an educational session at the city's sanitary-epidemiological station and the university clinic. Only after receiving flawless test results can foreign students continue further education at the university. While studying the analysis results of foreign first-year students from India, we considered their results as the "baseline" state of the body in response to "stress" during short-term adaptation to new social conditions and climatic factors, as well as the body's further adjustment to the process of long-term adaptation. The "baseline state" of the body is determined, on the one hand, by its genetic potential, and on the other — by the realization of this potential depending on the previous conditions of life [1].

The bodies of Hindu students, in the initial phase of acclimating to new living conditions and having a genetic adaptation to a hot climate, during the process of long-term adjustment to a sharply continental climate, reconfigure and can move to a new level of homeostasis activation, as well as reconfiguration of physiological systems [2].

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After processing with SPSS Statistics, the main mechanism of non-specific adaptation in foreign female students was indicated by red blood cell parameters. The average erythrocyte value was expressed by its minimum content of 3.2×10^{12}/L, while the average value was 3.9×10^{12}/L. At the same time, hemoglobin was noted as 120 g/L, indicating its average value. The minimum content showed 102 g/L, which was noted as a sign of iron-deficiency anemia. Analysis of the color index ranged from 0.8 for the minimum to 0.9 for the saturation degree of erythrocytes with hemoglobin, which falls within the reference value. The ESR (erythrocyte sedimentation rate) index, as seen in table 1, was noted at the boundary of the average value of 9.6 mm/hour. The MODE value (most frequently occurring value) for the four parameters, the average values of this parameter, and at the same time, the MODE value were close. In the leukocyte formula we studied for Indian female students during short-term adaptation to sharply continental conditions, the production of leukocytes in the bone marrow showed a reference value of 6.4×10^{9}/L. At the same time, the minimum value also remained within the normal range — 4.8×10^{9}/L. The percentage content of band neutrophils in the average value was expressed as 4.0%, and at the same time, segmented neutrophils (62.9%) remained within the normal limits.

Table 2

INDICATORS OF THE LEUKOCYTE FORMULA IN INDIAN YOUNG WOMEN

Name of values	*Leukocytes (White blood cells) 10^9/L*	*Band neutrophils (or Stab neutrophils)*	*Segmented neutrophils*	*Eosinophils*	*Lymphocytes*	*Monocytes*
1. Standard	4.0–9.0	1–6	47–67	0.5–5	18–40	3–11
2. Maximum	8.2	9	74	8	38	8
3. Minimum	4.8	1	0	1	14	2
4. Mode (Most frequent value)	4.0	3	60	2	20	5
5. Average value	6.45	4.02	62.96	2.93	23.8	5.18

The blood analysis showed a small percentage content of eosinophils as (2.9%). We determined that such a minimal content of eosinophils is not an indicator of an allergic reaction. Immune system cells - lymphocytes - are noted within the average value of 23.8%, not exceeding the normal range. Meanwhile, the average content of monocytes was 5.1%, indicating their normal percentage content in the blood composition. For foreign students, the MODE value, as the most frequently occurring value in the leukocyte formula, showed an average, stable value based on the SPSS Statistics program. Based on the above description, we concluded that, based on the results of the leukocyte formula, during short-term adaptation in foreign students, particularly Indian female students, there are no tendencies for overstrain and disruptions in the adaptation mechanism. Additionally, no decrease in health level or development of acute and chronic diseases was noted. Thus, our aforementioned “Assessment of the level of functional reserves of the body and the degree of their mobilization” forms the basis of the classification of functional states of the body. Within this, it originates from the range of “normal” or “physiological norm”, which depends on the adaptive capabilities of the body and its reactivity to various influences [3].

In the general blood analysis of male Indian students, we studied similar blood indicators as in Indian female students. These are erythrocytes, leukocytes, hemoglobin, color indicator, and ESR (erythrocyte sedimentation rate). The blood analysis of first-year male Indian students during short-term adaptation showed the following average values: erythrocytes — 4.0×10^{12}/L, hemoglobin — 131.46 g/L, leukocytes — 6.19×10^{9}/L, color index — 0.9 (CI), and erythrocyte sedimentation rate

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— 8.54 mm/hour. All blood parameters are relatively constant and do not exceed the reference value range. As indicated, all five blood parameters are noted within the limits of a practically healthy person. The results of the most common MODE value in male Indian students showed a reduced content of erythrocytes at 3.9×10^{12}/L when its average value shows 4.0×10^{12}/L, but at the same time, other red blood parameters by the MODE value were noted as a stable average value (Table 3).

Table 3

BLOOD ANALYSIS PARAMETERS OF INDIAN YOUNG MEN

Name of values	*Erythrocytes (or Red Blood Cells 10^{12}/L*	*Hemoglobin g/L*	*Leukocytes (White blood cells) 10^{9}/L*	*CI, Color Index*	*(ESR), Erythrocyte Sedimentation Rate mm/hour*
1. Standard	4.4–5.0	130–160	4.9–9.0	0.8–1.0	1–11
2. Maximum	4.9	142	8.2	1	15
3. Minimum	0.9	120	4	0.8	4
4. Mode (Most frequent value)	3.9	128	6	0.9	10
5. Average value	4,0	131.46	6.19	0.9	8.54

The study of the leukocyte formula is very important since any changes in the body result in the percentage content of certain types of white blood cells fluctuating from the physiological norm (Table 4).

Table 4

INDICATORS OF THE LEUKOCYTE FORMULA IN INDIAN YOUNG MEN, %

Name of values	*Band neutrophils (or Stab neutrophils)*	*Segmented neutrophils*	*Eosinophils*	*Lymphocyte*	*Monocytes*
1. Standard	1-6	47-67	0.5-5	18-40	3-11
2. Maximum	7	74	4	39	9
3. Minimum	1	49	1	17	2
4. Mode (Most frequent value)	1	59	2	27	5
5. Average value	2.96	62.67	1.9	26.7	4.67

In studying the leukocyte formula, the percentage ratio of white blood in Indian males was within normal limits. The average value of band and segmented neutrophils was expressed as 2.96% of the first neutrophils, and 62.67% showed segmented neutrophils. Eosinophils — 1.9%, lymphocytes also showed an average value of 26.7%, while monocytes by average values showed 4.67%. Based on the information we obtained, all indicators and calculations of the leukocyte formula indicate the absence of any pathology in foreign male students. The results of the MODE value remained unchanged and were within the permissible average value. Thus, based on the study of the blood analysis indicators of Indian males, we can speak of specifying the condition. The non-specific state of the body's resistance, the "stress" reaction, shows that during short-term adaptation upon arrival over a period of 14-21 days in different climatic conditions, the parameters of a general analysis in foreign male and female students varied within the stable reference value. This is explained by the "soft landing", a warm reception of foreign students by the host country, an abundance of diverse nutrition, good conditions, location, and social living conditions, and,

importantly, the still absence of sensations of a heavy study load. In the first year, students face a situation of uncertainty, requiring the mobilization of many of the body's resources. At a certain stage, the student successfully copes with various influences. Meanwhile, the level of the body's functioning is accompanied by intensive expenditure of life reserves. If the body fails to adapt to an extreme factor over a certain period, and its resources are depleted, fatigue may occur [4].

Thus, the above definition reflects that for each environmental requirement, the body responds with a special effect, and many other reasons have both objective and subjective character [4].

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