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## DEGREE OF ADAPTATIVE STRAIN AND CELLULAR RESPONSIVENESS OF ORGANISM IN PATIENTS WITH ACUTE SHIGELLOSIS

**Abstract.** *In patients with acute shigellosis within peripheral blood the percentage of polymorphonuclear heterophilic leukocytes is increased, while absolute number of these immunocompetent cells is factually unchanged. The absolute number and the percentage of agranulocytes (lymphocytes and monocytes) are significantly decreased.*

*Shigellosis in the majority (85,94 %) of patients is accompanied by formation of stress in (50,0 %) patients and by the reflex on the training session (35,94%). In insignificant number of patients with shigellosis the level of adaptative strain is in the zone of balanced arousal (10,16 %) and in the zone of excessive arousal (3,9%).*

**Key words:** *shigellosis, immunocompetent cells, adaptation.*

**Introduction.** Species resistance of human's organism is occurred by biological specialty of human's organism. It is nonspecific, sustainable, runs in the blood, related to specialties of individual's genotype and includes a lot of indicators [1, 2]. These indicators hold key positions in studying of anti-infective screening. The first phase of studying of indicators is determination of absolute number and percentage of leading immunocompetent cell pools basing on which other indicators of anti-infective screening are determined [3, 4].

**Objective:** to determine the level of adaptative strain and cellular responsiveness of organism in patients with acute shigellosis on the ground of indicators of absolute number and percentage of leading immunocompetent cell pools.

**Materials and methods.** Post-hoc test of 198 patient histories of patients with acute shigellosis, which were receiving medical treatment in infectious disease ward of regional clinical hospital in Chernovtsy during the period of 2011- 2015 yrs., was carried out by us.

**Results and discussions.** The degrees of autotoxemia, cellular and immune responsiveness of organism are the leading factors which determine the progress and severity of virulent disease. Determination of

these indicators is based on the detection of absolute number and percentage of leading immunocompetent cell pools.

The research outcomes of absolute number and the percentage of leading immunocompetent cells within peripheral blood in patients with shigellosis are provided in Table 1.

In patients with shigellosis (the tendency) towards decrease of absolute number of leukocytes by 26,64 % is formed. Moreover, the percentage of heterophilic leukocytes, when insignificant (by 3,16 %) decrease of absolute number, increases significantly (by 22,88 %). Increase of the percentage of heterophilic leukocytes is explained by increase of the percentage of stab neutrophils by 2,97 times and segmentonuclear multiform neutrophilous leukocytes – by 12,73%. Absolute number of segmentonuclear neutrophils is insignificantly (by 12,12 %) decreased.

Significant decrease of absolute number (by 88,42 %) and percentage (by 50,13 %) of lymphocytes and absolute number (from 3,86) and percentage (by 2,99 times) of monocytes. So shigellosis in humans is accompanied by significant increase (by 22,66%) of granulocytes and decrease (by 69,62%) of agranulocytes. It is the evidence of increased activity of factors and

Table 1

**Absolute number and the percentage of leading immunocompetent cell pools within peripheral blood in patients with shigellosis**

Indicators	Unit of measurement	Apparently healthy humans (70)	Patients with shigellosis (n=128)		
		M±m	M±m	The degree of immune abnormalities	P
Leukocytes	x10 <sup>9</sup> /l	6,37±0,51	5,03±0,47	-I	>0,05
Heterophilic leukocytes	%	61,53±1,87	75,61±1,97	+I	<0,01
	x10 <sup>9</sup> /l	3,92±0,78	3,80±0,62	-I	>0,05
Stab neutrophils	%	3,39±0,23	10,06±1,02	+III	<0,01
Segmentonuclear neutrophils	%	58,15±2,07	65,55±2,15	+I	<0,05
	x10 <sup>9</sup> /l	3,70±0,41	3,30±0,32	-I	>0,05
Acidophil leucocytes	%	1,83±0,12	2,11±0,14	+I	>0,05
Basophilic leucocytes	%	0	-	-	-
Lymphocytes	%	28,27±1,69	18,83±0,93	-II	<0,05
	x10 <sup>9</sup> /l	1,79±0,31	0,95±0,23	-II	<0,05
Monocytes	%	8,47±0,27	2,83±0,22	-III	<0,001
	x10 <sup>9</sup> /l	0,54±0,05	0,14±0,07	-III	<0,05
ESR	mm/year	4,43±0,31	24,11±0,31	+III	<0,001

mechanisms of nonspecific anti-infective screening at the start of the disease, and also formation of specific immune anti-infective screening in latent state - adaptive immunity.

Erythrocyte sedimentation rate (ESR) is also nonspecific shielding reflex that talks about an availability of pathologic process. ESR increases along with the shift of protein assay towards coarsely dispersed proteins (fibrinogens, Ehrlich's serum factors). There are links between increase of fractions of Ehrlich's serum factors and increase of ESR. Apparently healthy humans have normal type of ESR, and the patients with shigellosis - accelerated type, and indicator value is on the line between accelerated and rapid. ESR increase by 5,44 times may prove that progression of inflammatory processes of different nature - transmissible diseases, immune inflammation, aseptic inflammation, virus infections and parasitic diseases... .

Thus, at the beginning of admission of patient with shigellosis, the percentage of polymorphonuclear heterophilic leukocytes due to the increase (by 2,97 times) of stab segmentonuclear neutrophils increases within peripheral blood. The percentage of acidophil leucocytes increases insignificantly. Increase of percentage of granulocytes within peripheral blood of patients with shigellosis is accompanied by significant decrease of absolute number and the percentage of agranulocytes (lymphocytes and monocytes), that shows that at the beginning of infection process while admission to the hospital care, t-factors and mechanisms of nonspecific anti-infective screening in the organism of patient are activated and the latent phase of formation of humoral and cellular immune reflex comes. Accelerated type of ESR proves this thinking and evidences about the beginning of producing of M-class coarse-

molecular Ehrlich's serum factors by B-lymphocytes (by plasmacytes).

One of the topical issues of the modern medicine is the challenge of individuation of adaptative (accommodative) reflex of organism to different stimulants, diseases, pathologic states, surgical measures and other manipulations. All told causes to development of adaptative processes of different degree of strain, formation of stress that varies depending

on different severity, with a different duration and opportunity of compensatory processes. That is why the determination of degree of adaptative strain of organism in patients with shigellosis is an expedient goal.

The results of investigation of level of adaptative strain of organism in patients with shigellosis, when admissions to the hospital care, are provided in Table 2.

General (average) level of adaptative strain in

**Table 2**

**The level of adaptative strain of organism in patients with shigellosis**

Level of adaptative strain depending on zone	Patients with shigellosis (n=128) M±m	Apparently healthy individuals (n=70) M±m	Degree of abnormalities	P
General level	0,30±0,04	0,48±0,05	II	<0,05
Stress zone	64- 50,00%	0	-	-
Zone of reflex on training session	46 — 35,94%	14 — 19,72%	III	<0,05
Zone of balanced arousal	13 — 10,16%	26 — 36,62%	III	<0,05
Zone of excessive arousal	5 — 3,90%	31 — 43,66%	III	<0,05

patients with shigellosis is lower by 60% and is positioned on the line between stress (0,29) and the level of adaptative strain of the reflex on training session. Depending on the level of individual adaptative strain, the patients with shigellosis are divided on zones of adaptative arousal. The half of patients shows the stress of different severity (from 0,07 to 0,29), and kind of fewer patients are in the zone of the reflex on the training session, fewer patients are in the zone of balanced arousal, and little number of patients is in the zone of excessive arousal (including 2 patients in the non-arousal zone). The majority of patients with shigellosis when admissions to the hospital care are in the stress zone (50,5%) and in the zone of the reflex on the training session (35,94%).

Increased level of adaptative strain in patients with shigellosis requires the consultation of patient not only by infectious disease physician, but also by medical psychologist.

Cellular responsiveness of patient's organism plays crucial role in diagnostics, first of all in

pathogenesis of development, in the progress of shigellosis, the treatment and forecast of disease. Evocation on the exo- and endo-intoxication is the reflection of the cellular responsiveness of organism. Shigella produce low concentrations of enterotoxin and during their destruction shigellosis intracellular toxin is released. The level of cellular responsiveness of organism in patients with shigellosis was determined depending on leukocytal intoxication index of B.A. Reys and Ya.Ya. Kalf-Kalifa, depending on nuclear index of endotoxemia degree, hematological indicator of intoxication of V.S.Vasiliev. Investigated results of the cellular responsiveness of organism in patients with shigellosis are provided in Table 3.

It was demonstrated that in patients with shigellosis leukocytal intoxication index of B.A. Reys was significantly (by 73,77%) increased. Also indicator of intoxication is increased by 9,04 times, leukocytal intoxication index of Ya.Ya. Kalf-Kalifa is increased by 2,03 times, nuclear index of endotoxemia degree is increased by 2,5 times and hematological indicators of

Table 3

## Cellular responsiveness of organism in patients with shigellosis

Indicators	Units of measurement	Patients with shigellosis (n=128) M±m	Apparently healthy humans (70) M±m	Degree of immune abnormalities	P
Leukocytal intoxication index of B.A.Reys	c.u.	2,17±0,04	1,72±0,03	III	<0,01
Indicator of intoxication	c.u.	0,45±0,041	0,052±0,003	III	<0,01
Leukocytal intoxication index of Ya.Ya.Kalf-Kalifa	c.u.	3,53±0,04	1,25±0,02	III	<0,01
Nuclear index of endotoxemia degree	c.u.	0,14±0,02	0,06±0,01	III	<0,01
Hematological indicators of intoxication of V.S.Vasiliev	c.u.	1828,25±93,47	238,20±17,82	III	<0,01

intoxication of V.S. Vasiliev – by 7,74 times. Listed above prove the high degree (the III degree of immune abnormalities) of cellular responsiveness of organism in patients with shigellosis, that requires carrying out of efficient extracorporeal blood purification therapy and following application of sorbing agents.

**Conclusions:** 1. In patients with shigellosis the percentage of polymorphonuclear heterophilic leukocytes is increased, while absolute number of these immunocompetent cells is factually unchanged.

2. Shigellosis in the majority (85,94 %) of patients is accompanied by formation of stress in (50,0 %) patients and by the reflex on the training session (35,94%). In insignificant number of patients with shigellosis the level of adaptative strain is in the zone of balanced arousal (10,16 %) and in the zone of excessive arousal (3,9%).

3. Development and progression of shigellosis occurs upon conditions of increased cellular responsiveness of patients' organism.

**Prospects for further research.** Collected results are the cause to their use in diagnostics and treatment tactics of patients with shigellosis.

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