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INTENSIVE CARE UNIT MEDICAL STAFF ADAPTATION TO WORK WITH COVID-19, DEPENDING ON INDIVIDUAL PSYCHOPHYSIOLOGICAL FEATURES

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Abstract. ***Background.*** The relevance of the work is due to the need for early detection of disorders of the psycho-emotional state and disruption of adaptation mechanisms in doctors and nurses of intensive care units, which is an important task to prevent the development of critical conditions that lead to a decrease in the efficiency of personnel and the quality of medical care, especially in conditions of the emergence of new dangerous infections. ***The purpose of the work:*** to study the features of the formation of adaptive processes of the medical staff of the intensive care unit in the conditions of work with COVID-19, depending on the individual psychophysiological properties of the individual. ***Materials and methods.*** Test-questionnaires “Well-bein, activity, mood” (Doskin V.A.), test Ch. Spielberger’s adaptation by Yu.L. Khanin, S. Muddy’s resilience test, S. Badner’s test, evaluation of heart rate variability using rhythmocardiography. ***Results.*** It is shown that in extreme conditions of work with COVID-19, a high level of personal anxiety and a low level of resilience were observed in the group of doctors, as well as an increase in the sympathetic link of regulation and pronounced tension of the regulatory systems of the body. It is also noted that women had a lower level of resilience and high values of indicator of activity of regulatory systems. High activity rates of regulatory systems are characteristic of all subjects, regardless of gender and functions performed. After 6 months of work in the intensive care unit of an infectious hospital, the indicator of activity of regulatory systems corresponded to the pronounced tension of the regulatory systems of the body.

Key words: stress; COVID-19; coronavirus infection; personal anxiety; resilience; indicator of activity of regulatory systems; index of functional changes; intensive care unit.

ОСОБЕННОСТИ АДАПТАЦИИ У МЕДИЦИНСКОГО ПЕРСОНАЛА ОТДЕЛЕНИЯ РЕАНИМАЦИИ И ИНТЕНСИВНОЙ ТЕРАПИИ В УСЛОВИЯХ РАБОТЫ С COVID-19 В ЗАВИСИМОСТИ ОТ ПСИХОФИЗИОЛОГИЧЕСКИХ СВОЙСТВ ЛИЧНОСТИ

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Резюме. ***Введение.*** Актуальность работы обусловлена необходимостью раннего выявления нарушений психоэмоционального состояния и срыва механизмов адаптации у врачей и медицинских сестер отделений реанимации и интенсивной терапии, что является важной задачей для предотвращения развития критических состояний, приводящих к снижению работоспособности персонала и качества оказываемой медицинской помощи, особенно в условиях возникновения новых опасных инфекций. ***Цель работы:*** изучить особенности формирования адаптивных процессов медицинского персонала отделения реанимации и интенсивной терапии в условиях работы с COVID-19 в зависимости от индивидуальных психофизиологических свойств личности. ***Материалы и методы.*** Тест-опросники «Самочувствие, активность, настроение» (Доскин В.А.), тест Ч. Спилбергера в адаптации Ю.Л. Ханина, тест жизнестойкости С. Мадди, тест С. Баднера, оценка показателей вариабельности сердечного ритма с помощью ритмокардиографии. ***Результаты.*** Показано, что в экстремальных условиях работы с COVID-19 в группе врачей наблюдался высокий уровень личностной тревожности и низкий уровень жизнестойкости, а также усиление симпатического звена регуляции и выраженное напряжение регуляторных систем организма. У женщин были выявлены более низкий уровень жизнестойкости и высокие значения показателя активности регуляторных систем (ПАРС). Высокие показатели активности регуляторных систем характерны для всех испытуемых вне зависимости от пола и выполняемых функций. Через 6 месяцев работы в отделении реанимации инфекционного стационара ПАРС соответствовал выраженному напряжению регуляторных систем организма у всех волонтеров вне зависимости от пола и занимаемой должности.

Ключевые слова: стресс; COVID-19; коронавирусная инфекция; личностная тревожность; жизнестойкость; показатель активности регуляторных систем; индекс функциональных изменений; отделение реанимации.

INTRODUCTION

The professional occupation of doctors and nurses in intensive care unit is associated with constant physical and emotional stress. The spread of new coronavirus infection COVID-19 since December 2019, which has acquired proportions of a global pandemic, has made its own adjustments to conditions and intensity of work in medical staff [4]. The workload of doctors and nurses in intensive care unit corresponded to the extreme one during two years of the pandemic. Anaesthesiologists and intensivists under conditions of increased physical and emotional stress, had additional nervous tension with increased mortality in elderly patients and patients in critical condition [10, 17, 21]. Intensive care units' staff also had additional stress factors: a risk to be infected from a particularly dangerous infection in absence of specific treatment, worries about family and children, high mortality rate not only in patients but also in colleagues, increase in the number of patients and length of shifts, lack of equipment and medications for severe patients, physical stress when working in personal protective equipment [8, 12, 15, 16, 18, 20, 22, 23].

Professional occupation of both anaesthesiologists-intensivists and nurses of intensive care unit increased demands on stress resistance. Specificity of professional occupation lies in need to quickly make responsible decisions in conditions of emotional and information overload. When compared with doctors of other specialties, anaesthesiologists and intensivists experience emotional exhaustion 7 times more often, and in 60% of cases, occupational burnout develops [2, 5, 11]. The risk of development of psychological distress and failure of adaptation mechanisms is extremely high among staff of intensive care units working with COVID-19. Moreover, the incidence of anxiety and stress disorders in women is higher than in men [4, 24].

Early detection of psychological and emotional disorders, failure of adaptation mechanisms in doctors and nurses of intensive care unit is an important task for preventing the development of critical conditions. These lead to a decrease in the performance of staff and quality of medical care.

Both in the Russian Federation and abroad, there are scientific works devoted to study of burnout syndrome in medical staff during the COVID-19 pandemic, in particular, anaesthesiologists, intensivists and nurses of intensive care unit. However, there are few publications devoted to study of the characteristics of individual's psychophysiological properties and adaptation mechanisms. The individual characteristics of the body's response of intensive care units' staff in such conditions have not been sufficiently studied.

AIM

To study the features of the formation of adaptation processes in medical staff of an intensive care unit working with COVID-19, depending on individual psychophysiological properties.

MATERIALS AND METHODS

The study involved 25 medical workers of intensive care unit, including 9 anaesthesiologists and intensivists (5 men and 4 women), 12 nurses and 4 orderlies aged 25 to 50 years. Testing was carried out using the questionnaires "Well-being, activity, mood" (WAM) [3]; the level of personal and reactive anxiety was assessed using the Spielberger state-trait anxiety inventory adapted by Yu.L. Khanin [13]; the personality construct of hardiness test (by S. Maddi) modified by D.A. Leontiev and E.I. Rasskazova [7, 9] and the Budner's Tolerance of Ambiguity Scale [6] were used.

The physiological criteria for assessing adaptation were indices of functional changes [1] and experienced stress [14]. The indices of heart rate variability (HRV) were also assessed using rhythmocardiography (the CardioKit — HRV analysis software package was used for complex monitoring of cardiovascular and respiratory systems, tissue hydration): the index of regulatory system stress (ISS, c.u.); the root mean square of successive RR interval differences (RMSSD, ms), standard deviation (SDNN, ms), relative power of high-frequency oscillations (HF, %), relative power of low-frequency oscillations (LF, %), absolute power of very-low-frequency oscillations (VLF, ms^2), and Index of activity of the regulatory systems (IARS, c.u.).

All medical workers were examined before starting work in 'red zone' of a hospital (background study) and 6 months later (follow-up study/re-examination). For each participant it was the second period of work in such conditions. Statistical processing of the data was performed using parametric and non-parametric methods (Statistica 10 and Excel application software package). The chi-square test and Fisher's exact test were used in analysing the indicators. The critical level of significance in testing statistical hypotheses was ≤ 0.05.

RESULTS

During the study, people were divided into two groups: the first group included anaesthesiologists and intensivists (9 people), the second group included nurses and orderlies (16 people). Participants were also divided by gender.

The degree of resilience was 95.33 ± 6.0 points for men and 80.47 ± 4.7 points for women. The highest resilience indicators were found in nurses — 90 ± 4.35 points. In both the first and second groups, men had the highest resilience (Fig. 1).

The volunteers had a moderate level of personal anxiety, which did not exceed 42 points in the background study; the highest one was in women — 41.56 ± 2.01 points. A high level of personal anxiety, 42.67 ± 3.08 points, was in doctors regardless of gender. During the re-examination, personal anxiety indicators increased in all groups, and in doctors was high level, 46.33 ± 3.34 points, which is most likely due to the responsibility for lives and health of patients undergoing treatment.

Tolerance for uncertainty (TU) values were moderate and did not exceed 31 points for both men and women. However, TU was 22% higher for nurses than for doctors, and the lowest TU values were found in male nurses.

According to the testing results, a median of the WAM questionnaire was 5.11–5.09–5.53 points for women and 5.53–5.31–5.62 points for men. The median of the WAM questionnaire was slightly higher for doctors (5.44–5.26–5.72) than for nurses (5.16–5.12–5.47). The highest "activity-mood" indicators were found in male mid-level workers (6.0 points).

As the result of the study of heart rhythm variability, all subjects showed an increase in SDNN and RMSSD after 6 months of work by 19.5 and 12 %, respectively, indicating the strengthening of parasympathetic nervous system control. The autonomic regulation index (ARI) did not exceed the normal values and was 130.6 ± 17.72 c.u., however, when re-evaluated, there was a 10% decrease in this index. The tension index (TI) corresponded to normal values (80 ± 10.61 c.u.), and fluctuations of this index were insignificant at re-examination.

Moreover, the IARS at the beginning of the study was 3.28 ± 0.47 c.u., which corresponds to moderate stress of the

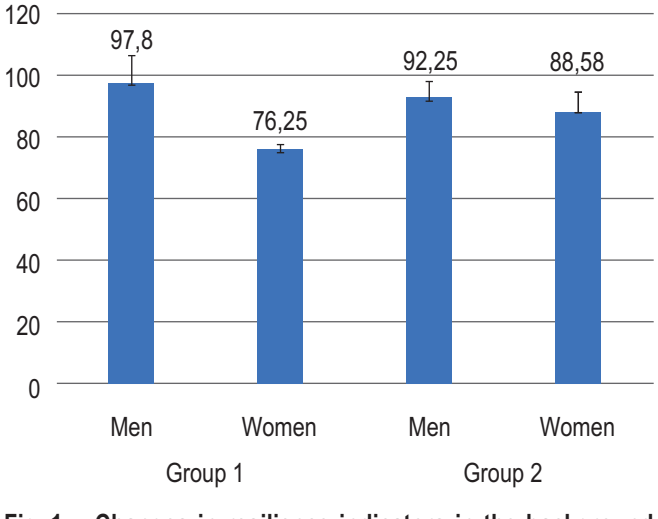

Fig. 1. Changes in resilience indicators in the background study among staff working with COVID-19 in ICU

body's regulatory systems. At the end of the study, this indicator was 6.04 ± 0.44 c.u., which corresponds to overstrain of the regulatory systems, and is characterised by insufficiency of the body's protective and adaptive forces.

Spectral analysis showed increased values of LF% (67.28 ± 2.98) and HF% (33.91 ± 3.16) waves in the background study, but no significant changes were found during the re-examination. Also, the data of the VLF indicator, which is a sensitive indicator of metabolic process control, was within reference values and amounted to 1168.56 ± 118.64 ms² in the background study and 1216.68 ± 115.49 ms² during the re-examination. This results can be regarded as mobilisation of energy and metabolic reserves during emotional stress.

When dividing into groups, in doctors, the values of SDNN and RMSSD did not exceed normal values in the population, and no significant increase was observed at the examination after 6 months. However, the values of ARI and TI, which also corresponded to the reference values, increased by 20.5 and 26%, respectively, at the re-examination. This indirectly indicates the predominance of sympathetic regulation and suppression of activity of the autonomous circuit. The IARS values at the first examination corresponded to moderate tension of the body's regulatory systems, when it requires additional functional reserves for adaptation to environmental conditions. At the re-examination there was an increase in IARS by 64.3 %, the values corresponded to pronounced tension of regulatory systems associated with active mobilisation of defence mechanisms, including an increase in activity of sympathoadrenal system.

In the group of nurses, an increase in SDNN and RMSSD values was noted upon re-examination by 21 and 17.6 %, respectively, which indicated an increase in parasympathetic regulation and decrease in the tension of the body's regulatory systems, while the ARI values decreased by 21.23 %. TI did not change significantly upon re-examination and did not go beyond the reference values. A decrease in ARI after 6 months of working with COVID-19 also indicates the predominance of parasympathetic activity and activation of adaptation mechanisms in this group. In nurses, an increase in IARS by 94.08% was also noted upon re-examination. In this group, at the beginning of the work, IARS corresponded to pronounced tension of the body's regulatory systems and exceeded this indicator in doctors by 8.7 %. In the repeated study, the IARS in nurses exceeded the indicator of the group of doctors by 28.4 %, which shows more pronounced overstrain of adaptive mechanisms in the group of nurses (Table 1).

Spectral analysis did not show any reliable change in the VLF, LF%, HF% indices during the re-examination in all groups, however, during both primary and secondary examinations, the LF% and HF% indices were outside the reference limits by 75 and 20%, respectively (Table 1).

When dividing the subjects by gender, in the male group, the SDNN and RMSSD indices during the primary examination exceeded the normal values and corresponded to 86.56 ± 15.31 ms, and 53.56 ± 10.56 ms, respectively. During the re-examination, these indices decreased by 10.7 and 7.89%, respectively. The ARI values were within the reference limits in population, but the re-examination revealed an increase in this indicator by 69.6%. An increase in the TI indicator was also noted after 6 months of observation by 98 % (Table 2). These changes show an increase in sympathetic regulation, suppression of the parasympathetic regulation. So, suppression of the activity of autonomic circuit and an increase in the tension of the regulatory systems of the body after 6 months of work in ICU with COVID-19 in male group develops.

At the first examination, the IARS in men corresponded to 3.22 ± 0.88 c.u., which indicates moderate tension of the body's regulatory systems. During the re-examination, the IARS in this group was 5.89 ± 0.57 c.u., which corresponds to pronounced tension of the regulatory systems.

In women, an opposite trend in change of the studied parameters was noted. An increase in the SDNN and RMSSD parameters was revealed at the re-examination by 40 and 26 %, respectively, and decrease in the ARI by 39 % and TI by 25.5 %. This indicated the suppression of the sympathetic regulation and strengthening of the parasympathetic

Table 1

Changes in heart rate variability at the start of the work with COVID-19 and after 6 months when dividing subjects into the group of doctors and group of nurses

Indicator of HRV		SDNN, ms	RMSSD, ms	ARI, c.u.	TI, c.u.	IARS, c.u.	VLF, ms²	LF,%	HF,%
Doctors	Background	70.44 ± 9.71	43.78 ± 3.68	102.0 ± 13.1	61.4 ± 8.05	3.11 ± 0.82	1248.1 ± 208.1	65.13 ± 6.92	34.87 ± 6.9
	Repeated studies	78.11 ± 9.36	46.11 ± 4.08	123.67 ± 13.43	77.4 ± 7.08	5.11 ± 0.87*	1286.11 ± 200.03	66.97 ± 5.9	32.56 ± 5.84
Nurses	Background	81.69 ± 9.07	51.94 ± 3.15	146.6 ± 16.53	90.4 ± 5.43	3.38 ± 0.62	1123.1 ± 152.1	68.50 ± 2.96	33.37 ± 3.46
	Repeated studies	100.6 ± 7.41	60.50 ± 3.41	115.69 ± 13.78	92.6 ± 3.94	6.56 ± 0.48*	1177.3 ± 144.8	71.58 ± 4.3	30.92 ± 4

* Significant differences in relation to background studies, $p < 0.05$.

regulation in this group, as well as the decrease in the tension of the regulatory systems. At the same time, the IARS increased by 85% and corresponded to the state of overstrain of the regulatory systems, which is characterised by the inability of protective and adaptive mechanisms to ensure an adequate response to impact of environmental factors (Table 2).

When comparing the index of functional changes (IFC), reliable differences were obtained when examining the values of all subjects at the beginning of work with COVID-19 and after 6 months. The average values of the IFC corresponded to "tension of adaptation mechanisms", increasing at the repeated study by 11.8% ($p < 0.05$). When divided into the groups of doctors and nurses, there was significant increase in the IFC in both groups at the re-examination by 10 and 13%, respectively ($p < 0.05$). No significant differences were found between the groups; the IFC corresponded to the "tension of adaptation mechanisms". When separated by gender, there was also an increase in the IFC in both groups by more than 10%, with no significant differences between the groups. The IFC also corresponded to the "tension of adaptation mechanisms" (Table 3).

Taking into account the multidirectional dynamics of the indicators when dividing into groups by gender and functional responsibilities, the attempt was made to assess the adaptive state depending on degree of activity of the sympathetic regulation. The assessment criterion was the index of tension of the regulatory systems. A group with pronounced parasympathetic activity included 11 people (3 men and 8 women). A group with pronounced sympathotonic activity consisted of 14 people (6 men and 8 women).

When studying the resilience of the groups, the indicator was higher in men, regardless of the study group. In the group with pronounced parasympathetic activity, the resilience indicator in men was 104.67 ± 11.05 points. This was 21.6% higher than the resilience indicator in women (86.13 ± 8.14 points). In the group with pronounced sympathotonic activity, the resilience indicator was also higher in men and was 90.67 ± 7.54 points, and in women it was 84.88 ± 6.25 points.

When studying personal (PA) and reactive (RA) anxiety, it was found that in women, regardless of the study group, the level of PA and RA was higher (Table 4) both in the background and repeated studies. In men, the RA and PA indicators corresponded to moderate level of anxiety both in the background and repeated study. In women, the reactive anxiety indicator increased to a high level. In the group with pronounced sympathotonic activity, PA and RA were higher than in group with pronounced parasympathetic activity both in the background and repeated study, regardless of gender. Reliable differences were observed in the repeated study (Table 4).

The tolerance of uncertainty values were "moderate" and did not exceed 30 points in men and women in both groups.

In the repeated study, the SDNN and RMSSD values in the group with pronounced parasympathetic activity increased by more than 2 times. The ARI decreased by 3.8 times, and TI by 3.2 times compared to the background study values. These changes indicated an increase in the parasympathetic regulation in this group, suppression of sympathetic regulation, and

Table 2

Changes in heart rate variability at start of the work with COVID-19 at ICU and after 6 months. Staff was divided into two groups by gender

HRV indices		SDNN, ms	RMSSD, ms	ARI, c.u.	TI, c.u.	IARS, c.u.	VLF, ms^2	LF,%	HF,%
Men	Background	86.56±5.31	53,56±10,56	99,22±9,8	61,44±3,35	3,22±0,86	1365,0±212,78	71,95±4,48	31,38±5,82
	Repeated study	77,22±7,23	49,33±11,47	168,89±4,01	121,67±7,21	5,89±0,57*	1241,89±204,38	70,09±6,91	32,98±6,42
Women	Background	72,63±7,95	46,44±6,25	148,25±25,40	90,44±14,70	3,31±0,59	1058,06±144,02	64,67±3,95	35,33±3,95
	Repeated study	101,13±7,99	58,63±6,64	90,25±18,92	67,81±12,99	6,13±0,64*	1202,5±103,52	69,82±3,92	30,68±3,73

* Significant differences in relation to background studies, $p < 0.05$.

Table 3

Changes in the index of functional changes in subjects at the start of work with COVID-19 at ICU and after 6 months. The staff was divided by gender and nature of the functional duties

Parameter	Men	Women	Doctors	Nurses
IFC, background study	2,49 ± 0,47	2,68 ± 0,42	2,81 ± 0,40	2,50 ± 0,43
IFC, re-examination	2,75 ± 0,38	3,02 ± 0,49*	3,09 ± 0,40*	2,83 ± 0,48*

* Significant differences in relation to background studies, $p < 0,05$.

Table 4

Changes in personal and reactive anxiety in groups depending on the degree of sympathetic activity

Group	Gender	Personal anxiety		Reactive anxiety	
		background	re-examination	background	re-examination
Staff with pronounced parasympathetic activity	Men	33,67 ± 5,67	32,00 ± 6,48	32,33 ± 4,97	30,33 ± 2,94
	Women	38,75 ± 3,23	41,63 ± 4,11	37,75 ± 3,48	41,00 ± 2,93
Staff with pronounced sympathotonic activity	Men	35,00 ± 3,60	39,83 ± 3,62*	33,17 ± 3,78	39,67 ± 3,83*
	Women	39,75 ± 3,02	46,63 ± 4,06*	37,50 ± 2,12	48,00 ± 2,81

* Significant differences in relation to repeated studies of the group with pronounced parasympathetic activity, $p < 0.05$.

Table 5

Changes in heart rate variability at the beginning of work with COVID-19 at ICU and after 6 months. People were divided by the adaptation mechanism

HRV indices		SDNN, ms	RMSSD, ms	ARI, c.u.	TI, c.u.	IARS, c.u.	VLF, ms^2	LF,%	HF,%
Staff with pronounced parasympathetic activity	Background	54,73 ± 10,26	34,4 ± 3,75	175 ± 3,88	106,18 ± 8,80	3,36 ± 0,6	1036 ± 173,33	70,17 ± 4,44	29,83 ± 4,44
	Repeated studies	143,09 ± 8,34*	73,82 ± 5,88	45 ± 6,01*	33,82 ± 3,73	7,18 ± 0,42*	1684 ± 152,60*	65,74 ± 4,24	34,05 ± 4,11
Staff with pronounced sympathetic activity	Background	95,64 ± 10,2	60,43 ± 7,94	195,71 ± 6,60	59,43 ± 3,42	3,21 ± 0,74	1272 ± 167,84	65,03 ± 4,29	37,12 ± 4,53
	Repeated studies	52,79 ± 8,14*	40,79 ± 7,16*	176,2 ± 5,90*	129,14 ± 4,97*	5,14 ± 0,64*	849,5 ± 177,6	73,2 ± 5,08	29,52 ± 4,85

* Significant differences in relation to background studies, $p < 0,05$.

decrease in the tension of the regulatory systems. Spectral analysis showed a decrease in LF%, which characterises the qualitative state of vascular tone regulation, and an increase in HF% waves in this group, indicating a shift in the autonomic balance towards the predominance of the parasympathetic regulation (Table 5).

At the same time, the integral indicator of the IARS in this group (background study) corresponded to moderate tension of the regulatory systems, whereas in the repeated study it increased by 2 times and corresponded to overstrain of the regulatory systems.

In the group with pronounced sympathotonic activity, reverse changes in the heart rate variability indicators were observed. A decrease in the SDNN and RMSSD by more than 30% was noted, as well as an increase in the ARI and TI by 2 times. Spectral analysis showed an increase in LF% and decrease in HF% waves, which indicates a shift in the autonomic balance towards the predominance of the sympathetic division (Table 5).

The integral indicator of IARS in this group during the initial examination also corresponded to moderate tension of the regulatory systems. During the re-examination, it was 1.3 times lower than the similar indicator of the group with pronounced parasympathetic activity and corresponded to the state of pronounced tension of the regulatory systems. This is associated with active mobilisation of defence mechanisms, including increased activity of the sympathoadrenal system and pituitary-adrenal axis (Table 5).

Table 6

Change in index of functional changes of subjects at the beginning of work with COVID-19 and after 6 months. Staff was divided by interference with adaptation

Indices	Group with pronounced parasympathotonic activity	Group with pronounced sympathotonic activity
IFC, background	2,59 ± 0,46	2,62 ± 0,44
IFC, re-examination	3,03 ± 0,48*	2,84 ± 0,45*

* Significant differences in relation to background studies, $p < 0,05$.

When comparing the IFC values in both groups, reliable differences were noted in the background and repeated studies. The average IFC values corresponded to the “tension of adaptation mechanisms”. In the group with pronounced parasympathetic activity, during the repeated study, the IFC increased by 16.9 %, and in the group with pronounced sympathotonic activity, by 8.3 % (Table 6).

It is worth noting that the state of overstrain of regulatory systems, which is characterised by insufficiency of protective and adaptive mechanisms, was detected in 24% of respondents in the background study and in 72% of respondents at the re-examination after 6 months of working with COVID-19. Among doctors, overstrain of adaptation mechanisms was

observed in 67% of respondents at the re-examination, among nurses — in 75%, while in the background study, overstrain of adaptation mechanisms was observed in 25 % of nurses. High IARS values by the end of working with COVID-19 were observed among men — 88.9 %, while in the background study, IARS corresponded to moderate stress of regulatory systems in the overwhelming majority of male respondents. In women, IARS corresponded to overstrain of regulatory systems in the baseline study in 25 %, in the repeat study — in 62.5% of respondents.

CONCLUSION

1. Under extreme conditions of work with COVID-19, the level of personal anxiety was higher and resilience was lower in doctors compared to nurses.

2. Women, depending on their professional duties and age, were less resistant to stressful situations, what was determined by low levels of resilience and high IARS values.

3. In the group with pronounced sympathotonic activity there was a less pronounced increase in the activity of regulatory systems (at the repeated study IARS in the group with pronounced sympathotonic activity was 1.3 times lower than in the second group), which is associated with active mobilisation of protective forces of the body in this group.

4. Tension of functional processes in doctors when performing professional duties may have etiological and pathogenetic significance for the development of psychosomatic disorders.

ADDITIONAL INFORMATION

Author contribution. Thereby, all authors made a substantial contribution to the conception of the study, acquisition, analysis, interpretation of data for the work, drafting and revising the article, final approval of the version to be published and agree to be accountable for all aspects of the study.

Competing interests. The authors declare that they have no competing interests.

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ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ

Вклад авторов. Все авторы внесли существенный вклад в разработку концепции, проведение исследования и подготовку статьи, прочли и одобрили финальную версию перед публикацией.

Конфликт интересов. Авторы декларируют отсутствие явных и потенциальных конфликтов интересов, связанных с публикацией настоящей статьи.

Источник финансирования. Авторы заявляют об отсутствии внешнего финансирования при проведении исследования.

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