УДК 612.017.2:613.6
http://dx.doi.org/10.22328/2413-5747-2022-8-2-30-37

PSYCHOLOGICAL STATE OF THE FISHING FLEET EMPLOYEES DURING CONTINUED SEA VOYAGES: A REVIEW

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INTRODUCTION: The adaptive human characteristics are time bound, hence an abrupt change of environmental conditions is crucial in adaptation process, specifically relevant maritime medicine.

OBJECTIVE OF THE STUDY: Based on literature data, to frame the issue of changes in psychological adaptive process among the fishing industry staff during long sea journeys and to justify the need of their constant medical supervision for early identification of possible health problems in the voyage period as well as during crew readaptation to the shore conditions.

MATERIALS AND METHODS: The literature has been searched in the international electronic databases of Web of Science, Scopus, also in the domestic library system eLibrary. The sources with a full-text access to the e-library are used. Time depth of the analysed literature coverage is the last 20–25 years, yet more than half of the sources are less than 5–7 years. The key words in the search engine are maritime labour, adverse occupational factors of maritime activities, the health of fishing transport staff, psychological adaptation of the sailing vessel crew.

RESULTS: Specificity of the adaptation problem in maritime medicine is primarily that seamen's body should adjust to a significant number of adversities in a relatively short time. Time discrepancy between these processes leads to the emergence of disadaptation disorders which might evoke pathological lesion. Psychological status has a pronounced impact on human adaptation to working environment. Individuals with pronounced weakness of nervous processes often experience breakdowns in tense navigation conditions. The literary data analysis of seamen's psycho-emotional state study in navigation conditions shows that even while short-term journey in the Arctic Basin seas most sailors experience mental tension of the central nervous system by the midterm. At long-term journey during a year-round Arctic navigation the phasal nature of psychological adaptation course is identified. In the first third of the journey the development of orienting response was observed due to the staff change and familiar social environment. By the middle of the journey there was a period of mental stabilization. By the end of the journey signs of psychological disadaptation were detected and intensified. Disadaptation changes include emotional instability, increased lability of the nervous system, particularly reflected in irritation, sleep disturbance, increased neuromuscular excitability, decline in mental and physical performance.

CONCLUSION: Seamen require constant psychophysiological monitoring to identify adaptive changes in the journey period and during crew readaptation to the shore conditions. Within the system of medical support to the water transport staff, an integrated manner of adverse conditions in professional environment is required in order to create high-quality and safe working conditions.

KEYWORDS: marine medicine, maritime labour, adverse professional conditions, health, psychological adaptation

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For citation: Kubasov R.V., Demin D.B., Boyko I.M., Khokhrina A.I., Kubasova E.D. Psychological state of the fishing fleet employees during continued sea voyages: a review // *Marine Medicine*. 2022. Vol. 8, No. 2. P. 30–37. DOI: http://dx.doi.org/10.22328/2413-5747-2022-8-2-30-37

Для цитирования: Кубасов Р.В., Дёмин Д.Б., Бойко И.М., Хохрина А.И., Кубасова Е.Д. О необходимости мониторинга психологического состояния у работников рыбопромышленного флота во время длительных морских рейсов // *Морская медицина*. 2022. Т. 8, № 2. С. 30–37, DOI: http://dx.doi.org/10.22328/2413-5747-2022-8-2-30-37

О НЕОБХОДИМОСТИ МОНИТОРИНГА ПСИХОЛОГИЧЕСКОГО СОСТОЯНИЯ У РАБОТНИКОВ РЫБОПРОМЫШЛЕННОГО ФЛОТА ВО ВРЕМЯ ДЛИТЕЛЬНЫХ МОРСКИХ РЕЙСОВ

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ВВЕДЕНИЕ: Приспособительные свойства организма человека ограничены временными рамками, поэтому большое значение в процессе адаптации имеет резкость изменений условий внешней среды, что особенно актуально в морской медицине.

ЦЕЛЬ: На основе данных литературы обозначить проблему наличия изменений психологических адаптивных процессов у работников рыбопромышленного флота во время длительных морских рейсов и обосновать необходимость их постоянного медицинского наблюдения для раннего определения возможных нарушений состояния здоровья как в рейсовый период, так и в течение реадаптации плавсостава к береговым условиям.

МАТЕРИАЛЫ И МЕТОДЫ: Поиск источников литературы осуществлен в международных электронных базах данных Web of Science, Scopus, а также отечественной библиотечной системе eLibrary. Использованы источники, имеющие полнотекстовый доступ электронных библиотек. Временная глубина охвата анализируемой литературы — последние 20–25 лет, при этом более половины составили источники не более 5–7-летней давности. Ключевые слова в поисковой системе: морской труд, неблагоприятные профессиональные факторы морской деятельности, здоровье персонала рыбопромыслового транспорта, психологическая адаптация плавсостава морского судна.

РЕЗУЛЬТАТЫ ИССЛЕДОВАНИЯ: Специфичность проблемы адаптации в морской медицине, прежде всего, заключается в том, что организм моряков должен приспосабливаться к значительному числу неблагоприятных факторов в относительно короткое время. Несоответствие во времени между этими процессами приводит к возникновению дизадаптационных расстройств, которые могут проявляться патологическими нарушениями. Выраженное влияние на адаптацию человека к условиям трудовой деятельности оказывает психологический статус личности. Лица с выраженной слабостью нервных процессов чаще дают срывы в напряженных условиях плавания. Анализ литературы, посвященной изучению состояния психоэмоциональной сферы моряков в условиях плавания, показывает, что во время даже непродолжительных рейсов в морях арктического бассейна у большинства моряков к середине срока работы выявляется нервно-психическая напряженность центральной нервной системы. При длительных рейсах во время круглогодичной арктической навигации у моряков выявлена фазность течения психологической адаптации. В первой трети рейса наблюдалось развитие ориентировочных реакций, обусловленных сменой коллектива и привычного социального окружения. К середине рейса наступал период психологической стабилизации. К концу рейса зачастую выявлялись и нарастали признаки психологической дизадаптации. К дизадаптационным изменениям относятся эмоциональная неустойчивость, повышенная лабильность нервной системы, что проявляется, в частности, раздражительностью, нарушением сна, повышением нейромышечной возбудимости, снижением умственной и физической работоспособности.

ЗАКЛЮЧЕНИЕ: Необходимо постоянное наблюдение за психофизиологическим состоянием моряков для определения адаптационных изменений в рейсовый период и в течение реадаптации плавсостава к береговым условиям. В рамках системы медицинского обеспечения работников водного транспорта необходим комплексный учет неблагоприятных факторов профессиональной среды с целью создания качественных и безопасных условий труда.

КЛЮЧЕВЫЕ СЛОВА: морская медицина, морской труд, неблагоприятные профессиональные факторы, здоровье, психологическая адаптация

The problems of adaptation of the organism to environmental conditions are of primary importance in studies of the physiological basis of human vital functions [1, p. 12–17; 2, p. 141–155;

3, p. 1–8]. According to modern concepts, it is necessary to evaluate not only the indicators of homeostatic systems functioning, but also the «price» that the organism pays for adaptation to new conditions of life activity. Under acute stress, the regulatory mechanisms of the functional system are under great functional strain. This contributes to the preservation of internal homeostasis. At chronic stress, on the contrary, changes of internal homeostasis are directed to restoration of higher levels of control system for connection of an organism with external environment [4, p. 1816]. Selye distinguished three phases of stress development: the stages of anxiety, resistance and exhaustion. The stability of the second phase is very relative, since both rises and falls of tissue biosynthetic activity take place on its background. This testifies to its dynamic and not always predictable development [5, p. 171]. Adaptation to environmental conditions can be carried out not only by the «stress» reaction type, but also by the «activation» or «training» reaction type. In this state, the organism is able to compensate for the disorders arising under prolonged exposure to extreme factors [6, p. 139–143]. The limits of a person's adaptive capabilities are determined by the value of the organism's physiological reserves. The higher they are, the lower the «cost» of adaptation. However, pathological states can form when climatic and geographical factors are particularly extreme or when functional reserves are insufficient [7, p. 259–289; 8, p. 6–11]. Adaptive properties of humans are limited in time. An important role in the process of adaptation is played by sharp changes in environmental conditions, which is especially relevant in marine medicine [9, p. 695–728]. Specificity of the problem of adaptation in maritime medicine lies primarily in the fact that the seafarers' organism should adapt to a significant number of unfavorable factors in a relatively short time. Inconsistency in time between these processes leads to occurrence of disadaptation disorders, which can manifest as pathological disorders [10, p. 66–83]. From these positions it is clear that with sharp changes of sailing regions, when the ship sails from high latitude area to low latitude area or, on the contrary, from south to north, there is a rapid change of environmental factors and it is more difficult for the seafarer's organism to adapt to new conditions [11, p. 74–83]. Seafarers' adaptation to new environment as a set of physiological reactions is aimed, first of all, at maintaining dynamic constancy of the organism's internal environment. The necessity to take into account seafarers' adaptation as an active form of connection between functional systems of an organism and a specific ecological system, such as a ship, is emphasized. At that, the more stable is the level of activity and interrelation of functional systems and regulation mechanisms providing normal vital activity of the organism and seafarers' ability to work under new conditions, the more perfect is their adaptation [12, p. 839–856].

Objective of the study. Identify, on the basis of the literature data, the problem of changes in psychological adaptive processes withing the employees of the fishing fleet during prolong sea voyages and to justify the need for their continuous medical supervision for early detection of possible health disorders both during the voyage period and during the readaptation of the crew to shore conditions.

Materials and methods. The search for literary sources was carried out in the international electronic databases Web of Science (Core Collection) and Scopus, as well as the Russian national library system eLibrary. Sources with full–text access of electronic libraries were used. The time deepness of coverage of the analyzed literature was the last 20–25 years, while more than half of the sources were no more than 5–7 years ago. Keywords in the search system: marine labor, unfavorable professional factors of marine activity, health of fishing transport personnel, psychological adaptation of the ship's crew.

Results. The human body has a great capacity to adapt to unusual working conditions. Works of a number of authors testify that labor physiology is a physiology of human reserve possibilities, as professional activity is accompanied by intensification or tension of all its functions. The degree of this intensification in correlation with physical and neuro-psychological loads is determined by the range of physiological reserves of the organism. They allow a person in a number of cases to endure without negative consequences and while maintaining a high capacity for work the impact of the values of extreme factors, significantly exceeding the maximum allowable levels or concentrations [13, p. 38–43; 14, p. 20–24].

Various data on the limits of resistance of a healthy person to unusual factors, which are specific to working conditions, largely determined by the range of physiological reserves in individual people. Developing these positions, a number of

other studies have concluded that the physiology of maritime labor is, in essence, the physiology of the reserve capabilities of the seafarers' organism. In most cases, the success of performing professional activities, especially in complex long voyages, is ultimately determined by the value of physiological reserves of the seafarers' organism. Physiological reserves of the human organism are provided by certain anatomical-physiological and functional features of the structure and activity of the organism. In particular, such an example is high resistance of cells and tissues of an organism to various external influences and internal changes of conditions of their functioning. Adaptation of seafarers' organism to unusual conditions of long voyages is based on this property of cells and tissues. At the same time, the initial process of adaptation during navigation is associated with changes in the regulatory systems of the organism in response to unusual influences, and its final result is largely based on the ability of cells and tissues to function in new conditions [15, p. 25–35].

Labor of crew is connected with extreme influences, being a peculiar model with great possibilities for disclosure of metabolism features, which in usual conditions are often hidden and are not shown in full measure[16, p. 192–200]. In extreme conditions of long and contrast voyages great possibilities of human organism can be realized. At that, its functions change in different ways depending on the role of each of them in general adaptive reaction of an organism [17, p. 13–15]. The use of the organism's reserve capacities under such conditions is based on the coordinated reactions of individual organs and systems, which, with their unequal changes, as a whole ensure optimal functioning of the whole organism [18, p. 43–46; 19, p. 12–18]. The concept of organism reserves is very broad and includes physiological and psychophysiological capabilities of an individual. The importance of studying the capabilities is due to the influence that the central nervous system has on other organs and systems. Psycho–emotional factor is one of the leading factors determining the specificity of ship crews' work in a long voyage [20, p. 103–105].

The seafarer's work in terms of psycho-emotional loads in the voyage, the duration of separation from the family, Motherland can be classified as «hard work» [21, p. 71–75]. Prolonged psychotraumatic situation can have an adverse effect on a person, and in some cases lead to a significant change in his mental state. According to the data of questionnaire polling of the seamen with a long period of service, the respondents singled out nervous overstrain among the harmful factors influencing their health (38% to 59% of the respondents in different groups). It is important to note that even in shore conditions the seamen experience nervous psychic overstrain related to difficulties of everyday life, difficulties of family life. Consequently, nervous-psychic sphere of activity of significant part of the crew outside the voyage is characterized by high degree of tension. It is no coincidence that the frequency of myocardial infarctions among fleet officers is 1.5 times higher than among Army officers. The factor of psychophysiological stress also contributes negatively to the formation of regulatory dysfunction of the autonomic nervous system [22, p. 15–23].

The changes that took place in the country gave a real possibility of uncontrolled increase in intensity and extensiveness of labor due to labor hypermotivation of both workers and employers. The authors of recent works on labor physiology define hypermotivation as a dominant desire to perform work to the detriment of realization of other motives, first of all labor safety and health preservation. They note that such inadequate humanistic principles in the motivational structure of personality often takes place in industries with heavy and harmful conditions, where the choice of rational in physiological sense means of motivation is especially important [23, p. 42–44; 24, p. 72–73].

Another type of hypermotivation is the desire to intensify labor. Under the conditions of entrepreneurial freedom and labor market, only general culture of both entrepreneurs and workers can be the main instrument of preventing negative consequences of hypermotivation. At that, one should not discount the cognitive component, i.e. knowledge of physiological and psychological effects of labor. The working and living conditions of seafarers deviate to a large extent from the norms of life. Their professional training should include physiological adaptation to working conditions, for which there are serious preconditions in such specific areas of labor physiology as aviation, high altitude and arid zone [25, p. 82–87].

The psychological status of a person has a pronounced influence on his/her adaptation to the conditions of labor activity [26, p. 45–51]. Persons with a pronounced weakness of nervous processes more often give a breakdown in stressful voyage conditions. 1–1.5 months after going to

sea, they present a number of characteristic complaints of irritability, mild excitability, rapid fatigability, memory loss, sleep disturbance. During an objective examination the seafarers reveal skin hyperesthesia, decreased active attention and short-term memory. In such seafarers with a long voyage possible formation of neuroses, which account for more than 90% of all mental illnesses among the crew [Polyakov]. Analysis of the literature data on the study of the psycho-emotional state of seafarers under navigation conditions shows that even during short (1–2 months) voyages in the Arctic basin seas the majority of seafarers had neuropsychological tension of the central nervous system by the middle of their voyage, which decreased with the arrival of the ship to the port of Arkhangelsk [27, p. 36–40]. During the long voyages during the all-year Arctic navigation, the seafarers were found to have a phase of psychological adaptation. Thus, when sailing up to 30 days there was a period of development of orientation reactions due to the change of the collective and the usual social environment. From 31 to 60 days there was a period of psychological stabilization. After three months of sailing in the Arctic latitudes there appeared and increased signs of psychological dysadaptation, which were manifested by the formation of internal tension and psychological discomfort, violation of social adaptation, inability to clearly understand the social norm, a tendency to formulate effectively-charged ideas. During long voyages a number of seafarers had a decrease in correlative functions of the cerebral cortex, and the number of complaints of neurotic nature depended on the conditions and areas of the voyage. At the same time there was an increase of excitability of sympathetic innervation centers with a simultaneous decrease of excitability of parasympathetic nervous system centers. In the period of navigation can arise overstrain of adaptive mechanisms and come a period of disadaptation disorders, which, as a rule, are noted after 3–3.5 months of voyage [28, p. 64–67]. Disadaptation changes, first of all, include emotional instability and increased lability of the nervous system, which are manifested, in particular, by irritability, sleep disorders, increased neuromuscular excitability, decreased mental and physical workability [29, p. 261–264].

Conclusion. Thus, a number of authors have established that psychophysiological examination of seafarers is important in the study of adaptive changes during navigation on shipboard. For reliable assessment of seafarers' physiological reserves it is necessary to perform psychophysiological examination not only during the voyage period, but also during the crew's re-adaptation to the coastal conditions.

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Authors' contributions. All authors met the ICMJE authorship criteria. Special contribution: RVK aided in the concept and plan of the study; IMB, DBD contribution to data collection provided collection and mathematical analysis of data; AIKh, EDK Contribution to the preparation of the manuscript

Вклад авторов: Все авторы подтверждают соответствие своего авторства, согласно международным критериям ICMJE (все авторы внесли существенный вклад в разработку концепции, проведение исследования и подготовку статьи, прочли и одобрили финальную версию перед публикацией). Наибольший вклад распределен следующим образом. Вклад в концепцию и план исследования — *Р. В. Кубасов.* Вклад в сбор данных — *И. М. Бойко, Д. Б. Демин.* Вклад в анализ данных и выводы — *А. И. Хохрина.* Вклад в подготовку рукописи — *Р. В. Кубасов, Е. Д. Кубасова.*

Потенциальный конфликт интересов: авторы заявляют об отсутствии конфликта интересов.

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

Поступила /Received: *10.03.2021*
Принята к печати/ Accepted: *16.05.2022*
Опубликована/ Published: *25.06.2022*

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