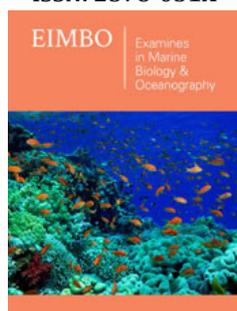


Life Conditions of Members of Vessel's Crew of the Northern Fishing Basins, Affecting the Musculoskeletal System. Risk Factors for Occupational Traumatism

Shapovalov KA* and Shapovalova PK

State Education Agency of Additional Professional Education of Republic of Komi, Russia

ISSN: 2578-031X



***Corresponding author:** Shapovalov KA, State Education Agency of Additional Professional Education of Republic of Komi, Russia

Submission: 📅 March 13, 2019

Published: 📅 March 20, 2019

Volume 2 - Issue 5

How to cite this article: Shapovalov K, Shapovalova P. Life Conditions of Members of Vessel's Crew of the Northern Fishing Basins, Affecting the Musculoskeletal System. Risk Factors for Occupational Traumatism. Examines Mar Biol Oceanogr:2(5). EIMBO.000548.2019. DOI: [10.31031/EIMBO.2019.02.000548](https://doi.org/10.31031/EIMBO.2019.02.000548).

Copyright@ Shapovalov KA, This article is distributed under the terms of the Creative Commons Attribution 4.0 International License, which permits unrestricted use and redistribution provided that the original author and source are credited.

Abstract

The fishing fleet is the basis for the economic and social development of the mining regions. The life conditions of members of vessel's crew of the Northern fishing basins affecting the musculoskeletal system are discussed. The main and additional risk factors of occupational traumatism are identified. The urgency of accident prevention on fishing vessels as a task of modern medical science, including marine medicine, is substantiated. Among the promising organizational and medical areas for reducing injuries to fishermen are the following:

- a) Elimination of the impact of specific conditions of production activity of fishermen working on long voyages in northern latitudes - cold and moisture, due to the creation of more comfortable working conditions and rest between watches.
- b) Reducing the effects of vibration and noise on the body of members of vessel's crew in the development of modern design solutions for the construction of new fishing vessels.
- c) A qualitative change in the organizational and medical approach to reducing the labor intensity of specialists on fishing vessels.
- d) Development of relevant medical and psychological programs to influence additional risk factors for traumatism of members of vessel's crew aimed at reducing and (or) eliminating family and household problems, low physical activity, bad habits, low medical literacy and low medical (preventive) activity of fishermen.

Keywords: Fishing fleet; Members of vessel's crew; Traumatism; Conditions of production; Risk factors

Mini Review

The specific working conditions of members of vessel's crew of the fishing fleet in the northern regions have a significant impact on the rates of industrial traumatism. The climate in high latitudes is characterized by low outdoor temperatures and insignificant monthly and annual fluctuations. The low water temperature, the low moisture capacity of cold air in the subarctic seas creates conditions for the slow evaporation of water, as a result of which the water vapor content in the atmosphere is low. The reduced absolute humidity of cold air causes a significant evaporation of moisture from the surface of the lungs when inhaled, which at low temperatures causes an increased feeling of thirst. Wind activity in northern latitudes is characterized by gusting winds of various directions throughout the year. The average annual wind speed reaches 8-10 meters per second. In winter, there is a sharp increase in wind activity. On average, about one third of all days currently are stormy. Frequent cyclones passing over the territories of subarctic regions entail a quick change of the outside air, accompanied by rain and fog. In wet weather, ice may form on the deck and the mechanisms of fishing vessels, and the deck will be more slippery. The clothes and shoes of the deck members of vessel's crew get wet. Characteristic features of the northern latitudes are a long snow period, a long-standing ice cover. When sailing in ice, the hull of the vessel experiences constant shocks and strikes against ice fields. Visibility is sharply reduced due to frequent snow charges, blizzards, blizzards and fogs. Severe working conditions of the floating structure during the polar night, poor visibility in the northern fishing basins have

a direct impact on the frequency and structure of occupational traumatism [1-6].

The duration of the adaptation of the organism to high latitudes, the most dangerous is in relation to accidents. The reason for slowing the regeneration of bone tissue during the local action of cold is a persistent circulatory disorder due to vascular spasm. Under the influence of cooling in a humid environment, the floating composition, representatives of other open productions of the northern regions, in 98% of cases, changes of bone tissue of a degenerative-dystrophic nature were radiographically detected. They are marked mainly in the bones of the extremities that undergo cooling during work, namely, the phalanges of the fingers, the heads and metaphases of the first metatarsal bones, metacarpal bones. Changes are expressed in the formation of osteophytes, spilled osteoporosis, islands of enosteous sclerosis, thickening of the bone beams of the spongy substance. Extensions of bone marrow spaces between the beams depend on the period of cooling and the depth of the neurovascular disorders and occur not only in the place of application of cold, but also in the bone tissue of the alveolar processes [7-12]. Among the reasons that cause professional pathology on fishing vessels, a significant place belongs to noise and vibration, which has a constant around-the-clock effect on the ship's crew during the entire voyage. On fishing vessels in 80.0% of cases increased permissible noise levels, in 25.0%-vibration. In the engine room of ships, noise levels meet the standards in 26.0% of cases, vibration-in 73.0%. In the central control station on fishing vessels, the compliance with noise standards is 18.0%, vibration - 37.0% of cases [13]. Existing noise levels on ships predetermine a high degree of mobilization of adaptation mechanisms among ship crew members, which may lead to their accelerated depletion and the development of pathological changes in the body. As a result of the vibration factor, a number of pathological states of both soft tissue elements and the skeleton base may develop, manifested as restructuring of the bone structure and strengthening of the bone tissue along the force lines of maximum pressure and thrust, a trophic bone pathology develops, which is the development of regional resorption distal nail phalanxes, the formation of enostoses, spondylosis of the thoracic spine. In the development of lesions of the osteo-articular system, it is not the parameters of vibration that are of primary importance, but the neurotrophic disorders caused by it. In the conditions of long voyages, an important factor in determining the health of members of vessel's crew is hypodynamic illness. Motor activity of fishermen is reduced by 6-10 times compared with coastal conditions. For members of ship teams, a decrease in the absolute value of the velocity of propagation of a shock mechanical wave was established as it passed through the muscles of ship crew members who were in a long voyage condition. Experimental and clinical data suggest that the restriction of muscle activity causes a complex of polymorphic disorders of members of vessel's crew on the part of blood circulation, respiration, neuromuscular and neuroendocrine systems, which are currently united by the concept of "hypokinesis disease" [14]. Thus, the complex effect of production factors determines significant professional changes in various body systems of fishermen, creates stress conditions for

the adaptation mechanisms and, when realizing factors appear, an increased traumatism rate [15-17].

Risk factors for occupational traumatism to fishermen on ships

Injuries occupy a leading place in the structure of the overall morbidity of members of crew on fishing vessels [18-21]. In the conditions of every day increasing mechanization and automation of labor on ships, traumatism prevention should be considered as the main reserve for the preservation of labor resources [22-27]. On modern fishing vessels, there is a qualitative change in the nature of the work of the crew members, who began to be engaged primarily in operator activities in the control system of a continuously moving facility. The use of integrated mechanization and automation in the fleet led to the fact that the labor component of members of vessel's crew decreased especially the physical component of labor, reduced the time required to process the information received and make the necessary decision due to a significant increase in the speed of ongoing production events [28-31]. Types of jobs of fishermen began to be characterized by a high degree of tension. The following occupational hazards that are potentially hazardous to the health of fishermen are highlighted, which increase the likelihood of diseases, their development and adverse outcome, directly or indirectly leading to the risk of injury [32-36].

The reasons for the intensity of labor professionals on fishing vessels

- a) Emotional and intellectual tension
- b) High degree of participation of higher mental functions
- c) Intensity of analyzer functions
- d) Monotony and nature of work

Additional risk factors for injuries of the floating composition of the fishing fleet

- a) Unfavorable working conditions
- b) Forced stay in a closed mainly male team
- c) Shift work with regular night watches
- d) Personal risk
- e) Responsibility for the safety of the vessel
- f) Frequent change of climatic and time zones
- g) Adverse climatic conditions
- h) Family problems
- i) Detachment from the shore and family
- j) Low physical activity
- k) Bad habits
- l) Low level of medical literacy
- m) Low level of medical (preventive) activity of fishermen [37-42].

On long voyages, the effects of meteorological factors (temperature, humidity, atmospheric pressure) and occupational hazards lead to different shifts in the health status of members of vessel's crew [43-47]. Typical of these are:

- a) Sensitive, superficial sleep, with frequent awakenings
- b) The appearance of various types of insomnia and lethargy after sleep
- c) Headaches
- d) Muscle pain, indirectly indicating a deterioration in the functional state of the nervous system
- e) Lengthening the latent time of reactions to sound, visual and temperature stimuli
- f) Reducing blood pressure
- g) increased pulse rate
- h) Changes in intracardiac conduction
- i) Increasing the concentration of blood sugar and cholesterol
- j) Changes in the content of Na⁺ and Ca⁺⁺ in the urine [48-54].

A long stay of the fishermen on the voyage leads to the development of general fatigue, and therefore the likelihood of traumatism increases. Thus, the problem of preventing accidents on fishing vessels remains one of the most pressing issues of modern science, including maritime medicine. Among the promising organizational and medical areas for reducing injuries to fishermen are the following:

A. Elimination of the impact of specific conditions of production activity of fishermen working on long voyages in northern latitudes - cold and moisture, due to the creation of more comfortable working conditions and rest between watches.

B. Reducing the effects of vibration and noise on the body of members of vessel's crew in the development of modern design solutions for the construction of new fishing vessels.

C. A qualitative change in the organizational and medical approach to reducing the labor intensity of specialists on fishing vessels.

D. Development of relevant medical and psychological programs to influence additional risk factors for traumatism of members of vessel's crew aimed at reducing and (or) eliminating family and household problems, low physical activity, bad habits, low medical literacy and low medical (preventive) activity of fishermen.

Acknowledgment

The authors express sincere love to their parents. The authors are grateful to Bychikhin NP, Orlov GA, Kucherenko VZ, Zhuravlev SM, Novikov PE, Zabin YL, Dobrodeeva LK, Kuznetsova MN, Klepikova RA, Udalova LS, Smolnikov LA, Pyankov SM, Ternovsky

LN, Batygina NI, Rzhetskaya VN, Duberman LB, Lus EA, Akhmeev VN, Schumacher RE and to all anonymous reviewers for their support, valuable advice, and helpful comments.

References

1. Shapovalov KA (1997) Social and medical issues of injury prevention fishermen: manual for physicians. Ministry of Health of the Russian Federation, Russia, pp. 3-24.
2. Aasjord HL (2006) Tools for improving safety management in the norwegian fishing fleet occupational accidents analysis period of 1998-2006. *Int Marit Health* 57(1-4): 76-84.
3. Bull N, Riise T, Moen BE (2001) Occupational injuries to fisheries workers in norway reported to insurance companies from 1991 to 1996. *Occup Med (Lond)* 51(5): 299-304.
4. Jensen OC, Stage S, Noer P (2005) Classification and coding of commercial fishing injuries by work processes: an experience in the danish fresh market fishing industry. *Am J Ind Med* 47(6): 528-537.
5. Shapovalov KA, Shapovalova LA (2013) Emergency treatment for injuries of floating crew on ships of northern pool. 18th World Congress for Disaster and Emergency Medicine. Manchester, United Kingdom.
6. Shapovalov KA (2017) Prevention of injuries of floating fleet as a form of conservation of labor resources. *Pacific Medical Journal* (3): 25-36.
7. Gavrilova KM, Pyankov SM (1966) Kliniko rentgenologicheskie izmeneniya v konechnostyah ot ohlazhdeniya v vode u rabochih rybnoy promyshlennosti. *Medicina truda i promyshlennaya ehkologiya* (2): 16-19.
8. Lawrie T, Matheson C, Murphy E, Ritchie L, Bond C (2003) Medical emergencies at sea and injuries among Scottish fishermen. *Occup Med (Lond)* 53(3): 159-164.
9. Matheson C, Morrison S, Murphy E (2005) The use of NHS accident and emergence services by commercial sea fishermen in the north east of scotland. *Occup Med (Lond)* 55(2): 96-98.
10. Shapovalov KA (2013) Injuries of the floating crew of the fishing fleet. People and the Sea. VII: Maritime Futures: International Conference. 26-28th of June. Amsterdam Abstracts Book, p. 116.
11. Shapovalov KA (2017) Occupational traumatism of members of vessel's crew on fishing fleet in the northern water's basin. *Annals of Marine Science* 1(1): 013-018
12. Shapovalov KA, Shapovalova PK (2017) Traumatism of members of vessel's crew on fishing fleet. Medical and Social Problems of a Professional Group of Industrial Workers. Geneva: World Health Organization (Pub rights) 24:1-32
13. Erenkova SM, Lukyanova VN (1972) Gigienicheskaya ocenka shuma i vibracii na promyslovyh sudnah tipa rt murmanskogo tralovogo flota. *Medicina Truda I Promyshlennaya Ehkologiya* 4: 12-15.
14. Vinnikova VN, Dombrovskij AYU, Zhuravleva VE (1989) Vnedrenie ozdorovitel'noj fizkul'tury na rybopromyslovyh sudnah. *Zdravoohranenie Ros. Federacii* 5: 27-29.
15. Shapovalov KA (1998) Medical and social justification of trauma care floating crew: dissertation for the degree of Doctor of medical sciences. Shapovalov Konstantin Albertovich, Research-and-production Association Medico-social Studies, Economics and Informatics of the Ministry of Health of the Russian Federation. Moscow, pp. 2-288.
16. Shapovalov KA (2014) Professional traumatism of floating crew of transport, fishing and river fleets of the northern watershed. 2nd international conference "oceanography-2014" USA.
17. Shapovalov KA, Shapovalova PK (2018) Comprehensive assessment of occupational traumatism of members of vessel's crew on transport and fishing fleets of the Northern waters basin. *Annals Marine Science* 2(1): 1-8. DOI: <http://dx.doi.org/10.17352/ams.000008>.

18. Barnackij VN, Balakin NG, Vihrov NI (1974) O sohranenii rabotosposobnosti plavayushchego sostava v more. *Sov Medicina* 4: 128-131.
19. Danilevskij AS (1860) Issledovanie sostoyaniya rybolovstva v Rossii, p. 2.
20. Shapovalov KA (1992) Traumatism with fatal outcome in maritime workers. *Int Marit Health* 43(1-4): 57-60.
21. Havold JI (2010) Safety culture aboard fishing vessels. *Saf Sci* 48:1054-1061.
22. Shapovalov KA (1992) Injuries of the floating crew of transport, fishing and river fleets of northern pool and measures for its prevention: Abstract of Dissertation for the degree of Kandidat of Medical Sciences/ Shapovalov Konstantin Albertovich, Scientific-research Institute of Medical and Medical-Technical Information of the Research-and-production Association Soyuzmedinform. Moscow pp. 2-19.
23. Allen P, Wellens B, Smith A (2010) Fatigue in british fishing. *Int Marit Health* 61(3): 154-158.
24. Carruth AK, Levin JL, Gilmore K, Bui T, Gallardo G, et al. (2010) Cultural influences on safety and health education among vietnamese fishermen. *J Agromedicine* 15(4): 375-385.
25. Dzugan J (2010) The development and efficacy of safety training for commercial fishermen. *J Agromedicine* 15(4): 351-356.
26. Shapovalov KA (2016) Falls from a height risk of suffering a traumatism for crew on vessels of the water basins of the north. *Bulletin of the Maritime Institute in Gdańsk* 31(1): 96-100.
27. Storholmen TC, Naesgaard OP, Faerevik H (2012) Design for end-user acceptance: requirements for work clothing for fishermen in mediterranean and northern fishing grounds. *Int Marit Health* 63: 32-39.
28. Bychkov VM (1968) Ob organizacii mediko-sanitarnoj pomoshchi rabochim rybnoj promyshlennosti Kaliningradskoj oblasti. *Zdravoohranenie Ros Federacii* 1: 10-13.
29. Vasileva TV, Ponomareva AG (1989) Aktualnye voprosy profilaktiki zabolevanij plavayushchij sostav morskogo transportnogo flota. *Sov zdravoohranenie* 8: 51-55.
30. Shapovalov KA (1985) Some aspects of the injury fishermen on vessels trawl fleet and its prevention: guidelines arkhangel'sk: regional organization of the society Knowledge of the RSFSR pp. 2-13.
31. Jensen OC, Laursen LH (2011) Reduction of slips, trips and falls and better comfort by using new anti-slipping boots in fishing. *Int J Inj Contr Saf Promot* 18(1): 85-87.
32. Shapovalov KA (2013) Injuries of floating crew of northern water pool in a state of alcohol intoxication. *Int Marit Health* 64 (1): 41-50.
33. Postrigan PA (1960) Travmatizm na predpriyatijah Ohotskogo rybopromyshlennogo tresta Habarovskogo sovnarhoza. *Ortoped Travmatol* 4: 51-53.
34. Hodov AM (1969) Travmatizm na kitobojnom promysle. *Sov Medicina* 2: 131-133.
35. Ehjsmont V, Boj EH (1968) Neschastnye sluchai pri rabote v morskoy rybolovstve trudy III Mezhdunar. simp. po morskoy medicine, g. Leningrad 26-28 iyunya 1968 g. M 185-191.
36. Kucera KL, Loomis D, Lipscomb H, Marshall SW (2010) Prospective study of incident injuries among southeastern united states commercial fishermen. *Occup Environ Med* 67(12): 829-836.
37. Dovgusha VV, Muhamedzhanov VA, Pogorelov IA (1989) Medicinskij kontrol za organizovannym posle pohodovym otdyhom moryakov. *Voen med Zhurn* 7: 57-59.
38. Petrov AA, Kulagin SM, Akovlev YUG (1978) Zabolevaemost' i organizaciya medicinskogo obsluzhivaniya rybakov na tonyah. *Sov zdravoohranenie* 1: 32-35.
39. Shapovalov KA (2007) Contingent of industrial workers: features of a traumatism of floating crew and complex actions for its prevention. *Geneva World Health Organization Pubrights* 11: 1-21.
40. Shapovalov KA (1989) Traumatism among the personnel of fishing boats. *Sov Zdravookhr* 7: 27-30.
41. Bottari T, Greco S, Panebianco A (2003) Trawling lesions: incidence in some fish species and preliminary statistical evaluations. *Vet Res Commun* 27(1): 285-288.
42. Day ER, Lefkowitz DK, Marshall EG, Hovinga M (2010) Utilizing united states coast guard data to calculate incidence rates and identify risk factors for occupational fishing injuries in new jersey. *J Agromedicine* 15(4): 357-362.
43. Shapovalov KA (1995) Medical and social aspects of injuries of sailors of the fish fleet. *Problemy socialnoj gigieny zdravoohranenija i istorija mediciny* (4): 17-25.
44. Chauvin C, Bouar G (2007) Occupational injury in the French sea fishing industry: a comparative study between the 1980s and today. *Accid Anal Prev* 39(1): 79-85.
45. Grimsmo PH, Harris EC, Reading I, Coggon D (2010) Occupational health needs of commercial fishermen in south west england. *Occup Med (Lond)* 60(1): 49-53.
46. Knudsen F, Gron S (2010) Making sense of fishermen's risk perception. *Policy and Practice in Health and Safety* 2: 77-94.
47. Lincoln JM, Lucas DL (2010) Occupational fatalities in the united states commercial fishing industry 2000-2009. *J Agromedicine* 15(4): 343-350.
48. Grigorev SD (1960) Opyt izucheniya zabolevaemosti rabochih rybnoj promyshlennosti. *Sov zdravoohranenie* (7): 60.
49. Orlovskij BF (1961) Proizvodstvennyj travmatizm na krabolovnoj flotilii Voprosy travmatologii i ortopedii: nauch.-metod inform. Irkutsk (9): 65-68.
50. Sviderskij VG (1987) Ohrana zdorovya rybakov-dal'nevostochnikov. *Sov zdravoohranenie* (3): 26-28.
51. Shapovalov KA (1997) Medical and social problems of traumatism of floating crew on transport, river, fishing fleets and the organization of emergency trauma care on ships: monograph. *Komi Book Publishers*, 3-226.
52. Levin JL, Gilmore K, Shepherd S, Amanda Wickman BS, Sara Shepherd, et al. (2010) Factors influencing safety among a group of commercial fishermen along the texas gulf coast. *J Agromedicine* 15: 363-374.
53. Percin F, Akyol O, Davas A, Saygi H (2012) Occupational health of Turkish Aegean small-scale fishermen. *Occup Med (Lond)* 62(2): 148-151.
54. Zytoon MA (2012) Occupational injuries and health problems in the egyptian mediterranean fisheries. *Saf Sci* 50(1):113-122.

For possible submissions Click below:

Submit Article