

REVIEW ARTICLE

THE EPIDEMIOLOGICAL PROBLEM OF GLOBAL EPIDEMICS DANGER TO ACUTE RESPIRATORY VIRAL INFECTIONS, ESPECIALLY CORONAVIRUS, FOR THE ORGANIZATION OF MASS SPORTING EVENTS: SOLUTION WAYS

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ABSTRACT

The aim: To find solutions for the ecological problems of epidemics danger to acute respiratory infections, especially coronavirus infections, during the organization of mass sporting events by establishing the features of its development and providing epidemiological measures to reduce the negative impact of epidemics for human health and activities, including athletes at both national and international levels.

Materials and methods: The methodological basis of this study is general and special scientific methods: dialectical, analysis and synthesis, synergism, historical and legal, formal and logical, systematic and structural, comparative and legal, formal and legal. Empirical data were scientific works, international regulations, EU legislation, United States and other countries.

Conclusions: The conclusions that the organization of mass sporting events must take into account the epidemiological situation of the disease in acute respiratory infections primarily on coronavirus infection at the national level to ensure contact with the institutions of the public health national system, use data "Hazard determination and risk assessment systems" (HDRAS) to determine the risk degree of infectious diseases, to conduct timely observation activities.

KEY WORDS: mass sports events, coronaviruses, acute respiratory viral infections, epidemics danger

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INTRODUCTION

It is known that epidemics of acute respiratory viral infections (ARI), which belongs to the group of the most common infectious human diseases and are able to cause epidemics on a global scale, not only a significant problem in terms of negative impact on public health and health of athletes too, as a separate group of it, but also for the organization of mass events, including sports. It is no accident that the problem of preventing the negative impact of ARI for the organization of mass events, including sports, deals with the WHO Regional Office for Europe and its experts (Examples: Poland – "World Youth Day", 2016; Spain – "World Pride Parade", 2017; Turkmenistan – "Asian Indoor and Martial Arts Games", 2017) in collaboration with WHO Headquarters and the WHO Network Centers. However, according to the WHO definition during public events should be understood "measures the number of participants which is large enough to make a risk mechanism for planning and regulation of the society, the state or the people". All these measures have been implemented by the WHO Regional Office for Europe to improve the public health systems of the countries concerned [1-8].

The features of the sports events organization is that it quite often has an international character, which increases the risk

of infectious disease and epidemics causing people from around the world arrival, including countries with a difficult epidemiological situation regarding infectious diseases [1-3].

Determined that ARI is a group of clinically and morphologically similar acute inflammatory diseases of the human respiratory system, the causative agents of which are pneumotropic viruses. These rather large groups of viral pathology other than influenza viruses (orthomyxoviruses) include parainfluenza viruses (paramyxoviruses), adenoviruses, rhinoviruses (enteroviruses), respiratory syncytial virus (PSV), and coronaviruses [9].

It is important to note that until recently, regarding ARI, experts from the WHO Regional Office for Europe to mass events, including sports (athletes' health), the greatest attention was paid to influenza viruses and much less to other pneumotropic viruses. In general, ARI coronavirus have been caused regarding athletes and their sports activities, discussed in the scientific literature, textbooks and materials of international organizations, mostly in a generalized form along with other pneumo viruses, without sufficient coverage of the epidemiology of coronaviruses in sports practice [10-11].

However, the outbreak of the COVID-19 coronavirus epidemic in China in 2019-2020, which began to spread to many countries around the world, including Japan, where

the XXXII Summer Olympics were planned in Tokyo in 2020 (and there was a proposal to move the XXXII Summer Olympics to London) made it very important to consider the problem of the epidemiology of coronaviruses and their dangers to both the health of athletes and their sports activities. In this regard, there is even a thesis that “sport has contracted the coronavirus” [12].

It should be borne in mind that, as modern practice shows, epidemics of coronaviruses can take the form of quarantine (convection) viral infections, such as contagious viral fever (Lassa, Marburg, Ebola), yellow fever. This is indicated by fairly high mortality, virulence, the ability to spread widely in such species of coronaviruses as SARS – COV, MERS – COV, COVID – 19 (SARS – COV – 2), and most importantly, that in practice quarantine measures are already imposed in areas where coronavirus infections occur (China, Italy, etc.). It should be noted that the term “quarantine infections” is not identical to the term “particularly dangerous infections” and means only a conditional group of infections in which quarantine may be imposed [13-16].

However, taking into account the peculiarities of the coronaviruses epidemiology, including the sports mass events, has not yet been emphasized so that they are separately provided for in the “International Health Regulations 2005” and the “WHO Health Emergencies Programme”. This was not provided for the recommendations of the WHO Regional Office for Europe regarding the mass events holding, including sports [5, 8, 17].

It is important to note that we have not yet developed the ways to reduce the negative impact of coronaviruses and its epidemics on the athlete’s health and their performance, making such development relevant and timely.

THE AIM

The article purpose – to find solutions for the ecological problems of epidemics danger to acute respiratory infections, especially coronavirus infections, during the organization of mass sporting events by establishing the features of its development and providing epidemiological measures to reduce the negative impact of epidemics for human health and activities, including athletes at both national and international levels.

MATERIALS AND METHODS

The methodological basis of this study is general and special scientific methods: dialectical, analysis and synthesis, synergism, historical and legal, formal and logical, systematic and structural, comparative and legal, formal and legal, and statistical [18]. Empirical data were scientific works, international regulations, EU legislation, United States and other countries.

REVIEW AND DISCUSSION

The analysis of various sources of information, including documents and scientific developments of WHO experts

showed that when applying epidemiological measures in organizing mass events, including sports, it is necessary to pay special attention to acute respiratory infections (ARI), especially coronavirus infection and its epidemiological features [5, 6, 8, 19, 20].

Coronaviruses family (Coronaviridae) according to the latest data has two subfamilies and includes 40 types of RNA – containing coronaviruses that affect humans and animals. The term “crown” is associated with their specific mechanism of penetration through the cell membrane by postiche the so-called “fake molecules” of molecules to which the body’s cell receptors respond [21, 22].

From an epidemiological point of view, including in relation to athletes, the greatest danger is posed by three types of coronaviruses [23, 24]:

- SARS virus – COV – known as the causative agent of SARS since 2002;

- MERS virus – COV – known as the causative agent of Middle Eastern respiratory syndrome since 2015;

- virus COVID – 19 (SARS – COV – 2) – known as the causative agent of pneumonia of a new type since the end of 2019.

The analysis of scientific, scientific-methodical literature and other sources of information showed that there is a special problem – the problem of possible negative effects of the epidemic, which is caused by coronaviruses not only on athlete’s health but also directly on their sports activities due to various epidemiological restrictive measures [12, 25, 26].

In this regard, one of the reasons for the negative impact of the epidemic caused by coronaviruses on sports activities may be restrictions in the form of quarantine followed by special observational measures, which in turn are defined as a set of special epidemiological measures, including restrictive aimed at reducing the negative effects of viruses, in this case coronaviruses on human health [27].

In determining the level of quarantine and observation measures, it should be borne in mind that the effects of coronavirus COVID – 19 on the human body on average are: 80% – mild symptoms that are not significantly life-threatening; 14 – serious problems, pneumonia, difficulty breathing; 5% – critical conditions – respiratory failure, septic shock; 2% – deaths. It is very important to use an electronic platform called the “Hazard determination and risk assessment systems” (HDRAS) to determine the extent of an epidemic to public health. It allows you to analyze information about dangerous factors from various sources of information, including the media (media), as well as social networks and more. The system used by experts of the European Regional Office to collect information on infections and other factors during mass events, including sports and the subsequent provision of advisory services, including the Chief Sanitary Inspectorate in Poland. The effectiveness of WHO’s work in preparing and conducting mass events was noted by the WHO Executive Board following the report “Global Mass Events: Their Importance and Opportunities for Health in the World” (Document EB 130/17) [5, 28, 29].

So according to information sources during the epidemic of 2020 in China, which was caused by the coronavirus COVID – 19, a significant number of athletes through the introduction of quarantine observation, was forced to train alone at home, that is not based on personal housing. This negative impact on their training process and as a result all their sports performance [30].

In addition, a coronavirus epidemic can lead to the postponement and even disruption of sports competitions. For example, the Chinese men's tennis team because of coronavirus COVID – 19 and the use of observational measures was forced to refuse to participate in the World Group playoffs and Davis Cup [31].

If there coronavirus infection and quarantine and observational measures necessary to follow with the provisions for the mass sporting events organization:

- to provide close contact at the national level for mass sports events organizers with the institutions of the national public health system, and at the international level, if necessary, with WHO experts and the WHO Regional Office for Europe (the latter for European countries);
- in planning for the mass sporting events organization in conditions of coronavirus epidemic it is necessary to take into account the general state of public health regarding the availability of coronavirus infection and quarantine and the application of observation measures for the territories and settlements (cities, etc.) where the mass sports events planned;
- if necessary to ensure timely evacuation of athletes from quarantine zones, as their presence in these areas can not only be dangerous to their health, but also affect the quality of training, competitive process;
- use the “Hazard determination and risk assessment systems” (HDRAS) to assess the danger degree of the epidemiological situation regarding coronavirus infection;
- to use diagnostic test methods of coronavirus infection to assess the epidemiological situation and to determine the athlete's health state;
- do not to allow spectators and fans from quarantine areas to places of mass sports events;
- to maximum limit as much as possible the presence of elderly people and children at sports events as high-risk groups for coronavirus infections;
- do not to allow domestic and farm animals as possible sources of coronavirus infections on the territory and in the premises where sports events are held;
- to perform general hygiene requirements, hands cleaning and disinfection, dressing protective face masks and its timely replacement with new ones and so on.

CONCLUSIONS

The epidemiological problem of epidemics of acute respiratory viral infections (ARI), especially coronavirus in the organization of mass sports events can pose a significant threat to the health of athletes and their sports activities and therefore requires a comprehensive, systemic solution, with special attention to coronavirus infections.

Comprehensive, systematic solution of this epidemiological problem should include such measures as observation and quarantine, zoning of areas according to the degree of danger of SARS, the use of rapid diagnostic methods, vaccination, the maximum possible provision of athletes with the opportunity to engage in sports activities, epidemiological assessment their dangers, fulfillment of the general sanitary – epidemiological requirements.

REFERENCES

1. Meijer A., Webster C., William R. et al. The COVID-19-crisis and the information polity: An overview of responses and discussions in twenty-one countries from six continents. *Information Polity*. 2020;25 (3): 243-274. doi: 10.3233/IP-200006.
2. Blackburn J. K., Kralik I. T. and Fair J. M. Applying Science: Opportunities to Inform Disease Management Policy with Cooperative Research within a One Health Framework. *Front. Public Health*. 2016;3:276. doi: 10.3389/fpubh.2015.00276.
3. Chinazzi M., et al. The effect of travel restrictions on the spread of the 2019 novel coronavirus (COVID-19) outbreak. *Science*. 2020; 368 (6489): 395–400. doi: 10.1126/science.aba9757.
4. Brukner P. *Clinical Sports Medicine*. Third edition. «McGraw-Hill». 2008, 1084 p.
5. Ute E., Regm J. Ukrepniiye sistemy obshchestvennogo zdravookhraneniya: opyt organizatsii massovykh meropriyatiy. [Strengthening public health: making the case for mass gatherings]. 2018. *Panorama obshchestvennogo zdravookhraneniya*. 2018;4(1):67-71.
6. Bounce Back Better: Sustainable Strategies for a Healthy Recovery from the Pandemic. 2020. https://www.iseepi.org/common/Uploaded%20files/2020%20Website%20Edits/Policy/final%20ats%20ers%20isee%20covid%20air%20pollution%20and%20health_08182020.pdf Accessed October 03, 2020.
7. Malchow H., Petrovskii V., Venturino E. *Spatiotemporal Patterns in Ecology and Epidemiology: Theory, Models, and Simulation*. USA: CPS – Press, Series: Mathematical and Computational Biology. 2019, 469 p.
8. Salamans P. WHO's new emergencies program bridges two worlds. *Bull World Health Organ*. 2017; 95(1):8–9. doi: 10.2471/BLT.17.030117.
9. van Doorn H.R., Yu H. *Viral Respiratory Infections*. *Hunter's Tropical Medicine and Emerging Infectious Diseases*. 2020:284–8. doi: 10.1016/B978-0-323-55512-8.00033-8.
10. Roberts J. A. *Viral Illnesses and Sports Performance*. *Sports Medicine* 1986;3: 296–303. doi: 10.2165/00007256-198603040-00006.
11. Martin S. A., Pence B. D., Woods J. A. Exercise and respiratory tract viral infections. *Exercise and sport sciences reviews*. 2009; 37(4): 157–164. doi: 10.1097/JES.0b013e3181b7b57b.
12. Ying-Ying Wong A. et al. Impact of the COVID-19 pandemic on sports and exercise, *Asia-Pacific Journal of Sports Medicine, Arthroscopy, Rehabilitation and Technology*. 2020; 22:39-44. doi: 10.1016/j.asmart.2020.07.006.
13. Day T. et al. When Is Quarantine a Useful Control Strategy for Emerging Infectious Diseases?, *American Journal of Epidemiology*. 2006;163(5):479–485. doi: 10.1093/aje/kwj056.
14. Tognotti E. Lessons from the history of quarantine, from plague to influenza A. *Emerging infectious diseases*. 2013;19(2): 254–259. doi: 10.3201/eid1902.120312.
15. Bloom D. E., Cadarette D. *Infectious Disease Threats in the Twenty-First Century: Strengthening the Global Response*. *Frontiers in immunology*. 2019;10: 549. doi: 10.3389/fimmu.2019.00549.

16. Ewald P.W. Guarding against the most dangerous emerging pathogens. *Emerging infectious diseases*. 1996; 2(4): 245–257. doi: 10.3201/eid0204.960401.
17. International Health Regulations. The official portal of Verkhovna Rada of Ukraine. https://zakon.rada.gov.ua/laws/show/897_007. 2005. Accessed October 03, 2020.
18. Danyl'yan O. H. Orhanizatsiya ta metodolohiya naukovykh doslidzhen [Organization and methodology of scientific research]. Kharkiv: Pravo, 2017; 448 p. (in Ukrainian)
19. Wiersinga W.J., et al. Pathophysiology, Transmission, Diagnosis, and Treatment of Coronavirus Disease 2019 (COVID-19): A Review. *JAMA*. 2020;324(8):782–793. doi: 10.1001/jama.2020.12839/
20. Aleta A., Martín-Corral D., Pastore y Piontti A. et al. Modelling the impact of testing, contact tracing and household quarantine on second waves of COVID-19. *Nat Hum Behav*. 2020; 4,: 964–971. doi: 10.1038/s41562-020-0931-9.
21. Chorba T. The Concept of the Crown and Its Potential Role in the Downfall of Coronavirus. *Emerging Infectious Diseases*. 2020;26(9):2302-2305. doi: 10.3201/eid2609.ac2609.
22. Liu C. et al. Research and Development on Therapeutic Agents and Vaccines for COVID-19 and Related Human Coronavirus Diseases. *ACS Central Science*. 2020; 6 (3): 315-331 doi: 10.1021/acscentsci.0c00272.
23. Peeri N.C. et al. The SARS, MERS and novel coronavirus (COVID-19) epidemics, the newest and biggest global health threats: what lessons have we learned?, *International Journal of Epidemiology*. 2020; 49(3): 717–726. doi: 10.1093/ije/dyaa033.
24. Zheng J. SARS-CoV-2: an Emerging Coronavirus that Causes a Global Threat. *International journal of biological sciences*. 2020; 16(10): 1678–1685. doi: 10.7150/ijbs.45053.
25. Cauchemez S. et al. Closure of schools during an influenza pandemic, *The Lancet Infectious Diseases*. 2009;9(8):473-481. doi: 10.1016/S1473-3099(09)70176-8.
26. Samuel R. D., Tenenbaum G., and Galily Y. The 2020 Coronavirus Pandemic as a Change-Event in Sport Performers' Careers: Conceptual and Applied Practice Considerations. *Front. Psychol*. 2020; 11:567966. doi: 10.3389/fpsyg.2020.567966.
27. Yen-Hao Chu I., Alam P., Larson H. J. et al. Social consequences of mass quarantine during epidemics: a systematic review with implications for the COVID-19 response, *Journal of Travel Medicine*. 2020;27(7):192. doi: 10.1093/jtm/taaa192.
28. Yi Y., Lagniton P., Ye S. et al. COVID-19: what has been learned and to be learned about the novel coronavirus disease. *International journal of biological sciences*. 2020; 16(10): 1753–1766. doi: 10.7150/ijbs.45134.
29. Shang Y., Pan C., Yang X. et al. Management of critically ill patients with COVID-19 in ICU: statement from front-line intensive care experts in Wuhan, China. *Ann. Intensive Care*. 2020; 10: 73. doi: 10.1186/s13613-020-00689-1.
30. Mendell E. Rooftop Drills and Home Games on Foreign Turf: Coronavirus Alters China's Olympic Prep. *The Wall Street Journal*. 2020. <https://www.wsj.com/articles/rooftop-drills-and-home-games-on-foreign-turf-coronavirus-alters-chinas-olympic-prep-11582730587>. Accessed October 03, 2020.
31. Coronavirus: sporting events in China under threat as virus spreads, *Deutsche Welle*. 2020. <https://www.dw.com/en/coronavirus-sporting-events-in-china-under-threat-as-virus-spreads/a-52165953> Accessed October 03, 2020.

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