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HYGIENIC ASSESSMENT OF RISK FACTORS FOR SKIN INFECTIONS IN ATHLETES-WRESTLERS

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Study by virtue of informed consent and questionnaire survey involved healthy male volunteers: 91 athletes of wrestling and 52 students not doing sports. It was found that most respondents (55%) among wrestlers suffered from skin contagions at least once. To do hygienic assessment of risk factors for skin infections in wrestlers there's a recommended "rule of nines" method by A. Wallace which estimates open skin areas (i.e. unprotected by sports outfits) in different types of wrestling. The athletes study results showed high risk of skin infections in this target group, especially in wrestlers. The number of skin infections cases among wrestlers surveyed was 9.5 times higher ($p < 0.001$) than among students not involved in professional sports. The basic risk factors for wrestlers' skin contagions in sport training and competitions processes are: direct factors which include regular contact "skin to skin" during competition; failure to meet body hygiene, clean sportswear and shoes requirements; athletes with obvious signs of infection at competitions and trainings. Indirect factors include regular state of stress due to frequent competitions, daily workouts, etc. Therefore we think it vital to systematically inform all the participants in sport training and competitions process on the existing risks of skin infections for athletes and negative consequences thereof.

Key words: risk factors, skin contagions, sportsmen, wrestlers, hygienic assessment, "rule of nines", direct factors, indirect factors.

Rationale. Among numerous risk factors for infectious diseases we can identify sport exercising also due to the closed groups of people in contact with each other and with the infected objects, mechanical skin lesions (microtrauma, racomas, maims) which can serve as a gateway for infection [1.5, 6.7]. In turn, skin pyoinflammatory diseases rank first in the general structure of infectious pathology of athletes [2,3,12]. Practice shows that every athlete during his sports career faces problem of skin contagions (SC) [4,13,16]. The most common infections among wrestlers are: mycotic infections (such as ringworm); viral infections (such as "herpes gladiatorum", the causative agent thereof is herpes simplex virus (HSV-1)); bacterial infections (e.g. impetigo) caused by staphylococci or streptococci, including

methicillin-resistant *Staphylococcus aureus* (MRSA) [8-11,14,15]. Cases of athletes skin infections during workouts or competitions will inevitably lead to development of pathological conditions that prevent translational progress in physical condition and, as a result, lack of high records [10]. Unfortunately, the main "culprits" of spreading infectious diseases are athletes themselves, who, when finding enanthesis, keep sport trainings and take part in competitions, misleading medical staff by "burning" the eruption locus with chemicals. Detection of skin contagion may cause disqualification of an athlete which is unacceptable for him especially before important events. The foregoing identified the rationale for the present study.

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Study target: to identify and assess risk factors for skin infections in wrestlers in training and competition process.

To achieve this target we solved the following tasks:

1. Study national and foreign literature on the subject of the present research.
2. Determine the list of eventual risk factors for skin infections of athletes in wrestling.
3. Assess hygienic requirements for sports outfits, shoes compliance, for hygiene features of athletes-wrestlers body.
4. Analyze features of sports outfits for different types of wrestling.

Research methods and management: collection of information and analysis of literature, questionnaires, description, comparison, analysis, synthesis.

With the view to identify prevalence of skin problems among wrestlers, as well as to analyze the compliance with hygiene requirements for clean sport uniforms, shoes, features of keeping body hygiene by athletes-wrestlers, 91 respondents were surveyed. The mean age of the respondents was 16.8 (3.1) years. The reference group consisted of students not involved in sports ($n = 51$), with the mean age of 19.2 (1.0) years.

To estimate open areas of athlete's body, i.e. the percentage of areas unprotected by sport uniform of wrestlers, we used method proposed by A. Wallace in 1951 and widely applied in clinical practice to assess burn area, the "rule of nines". This method is based upon the fact that integuments area of particular parts of adult body equals to or a multiple of nine. For adults (aged over 15): head and neck: 9% of the body surface; one upper limb: 9%; one lower limb: 18% (hip: 9%, lower leg and foot: 9%); front body surface: 18%; back surface of the body: 18% [8]. Data was statistically processed using the software "Statgraphics plus for Windows", Microsoft Excel 2000 and "Statistics with Confidence" tool involving statistical methods according to Kolmogorov-Smirnov test. We used the following indices to describe incidence of SC: the proportion and precise confidence interval for the proportion of 95%, calculated based on binomial distribution. To assess reliability of incidence variance (proportions) and compare proportions we used the following indices: χ^2 criterion, Fisher's exact test, the exact confidence interval of 95% for the difference between proportions by Newcomb.

Research results and discussion. According to the questionnaire, the number of skin infections in anamnesis vitae is 9.5 times higher among ath-

letes-wrestlers surveyed ($p < 0.001$), than among students not involved in professional sports: the majority of wrestlers 54.95% (44.16-65.41%) suffered from skin contagions at least once. In the reference group of students who are not involved in professional sports only 5.77% (1.21-15.95%) of respondents faced with skin contagions at least once. We determined that 9.89% (4.62-17.95%) of the surveyed athletes-wrestlers who underwent SC from two to three times; 4.40% (1.21-10.88%): from four to six times; 2.2% (0.27-7.72%) of the respondents were ill from six to ten times (Fig. 1). Besides, the number of athletes-wrestlers who underwent skin infectious diseases was significantly higher ($p < 0.01$) than those who have never suffered from these diseases. The number of wrestlers who had SC 2 times was significantly lower ($p < 0.01$) than those who underwent SC at least 1 time.

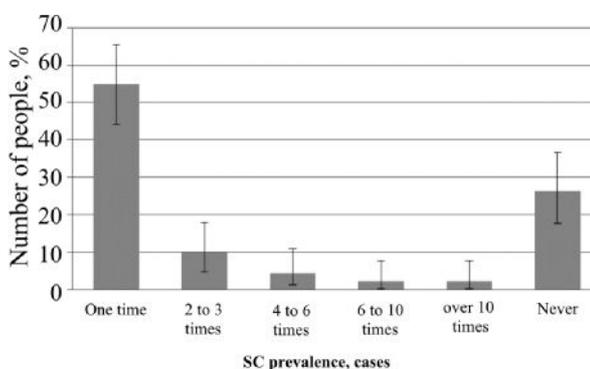


Fig. 1. Number of skin infection diseases suffered by athletes-wrestlers

When analyzing the study results, we identified groups of risk factors for skin infections and divided them into two groups. We referred the factors directly determining risk of skin infections to the first group. Among them:

1. Close contact with infectious disease source or carrier during competition/workouts. Most respondents of athletes-wrestlers often travel to competitions at various levels: 47.25% (32.53-53.57%) every month or more; 42.86% (36.69-58.0%) several times every six months; and only 5.49% (1.80-12.35%) said, they did not go, and 4.40% (1.21-10.88%) of respondents said that due to the injuries they were temporarily out of the abovementioned events. Participation in the All-Russia and international level competitions and "skin to skin" contact with the wrestlers from other regions and countries increases the risk of various skin diseases (Figure 2).

The given fact is confirmed by the respondents: 8.79% (3.87-16.59%) responded that they

often see athletes who have skin infections, about 20.88% (13.06-30.67%) of the respondents meet them, but rarely, and 12.09% (6.19-20.60%) very rare (Figure 3).

The majority of respondents train 5-6 times a week, and the percentage of athletes with obvious signs of skin infections during workouts is quite high: 37.36% of the respondents met cases of their team members skin infections; 29.67% (20.55-40.16%) did not pay attention to them. And the number of those who saw/ drew attention to the obvious signs of SC was significantly higher ($p < 0.01$) than those respondents who didn't see/pay attention to SC of their team members.

2. Contact with the infected surfaces (mats, wrestling mats, sports equipment, like towels, dum-mies).

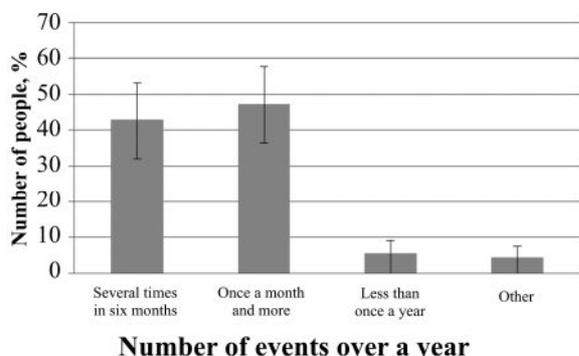


Fig. 2. Periodicity of athletes-wrestlers participation in competitions for a year

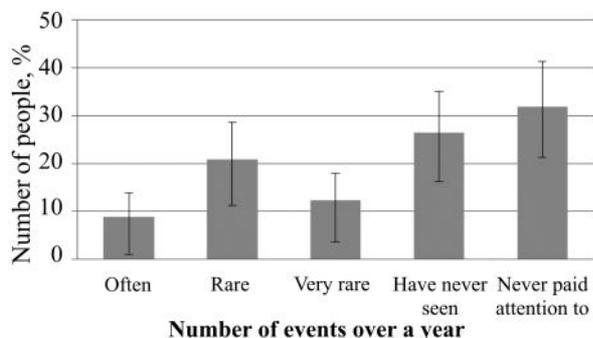


Fig. 3. "How often do you meet athletes with obvious signs of SC in the competition?"

3. Injuries during competitions and workouts. Almost every fight ends with numerous bruises, maims and other skin disorders which can serve as a gateway for infection.

4. Sports equipment features. Sports equipment in some kinds of wrestling differs in the fact that does not cover large areas of athlete's body that precondition "skin to skin" contact of the opponents during the fight. Another feature of sports

equipment is the use of synthetic fabrics, which in turn increase slipping and fit snugly to the body of an athlete, but do not allow the skin to "breathe", contribute to the occurrence of intertrigos and provide favorable environment for development of pathogenic micro-organisms on skin.

Using the "rule of nines" we estimated the open skin area (i.e. unprotected with sports outfits) in different types of combat: wrestling (Greco-Roman, freestyle), belt wrestling, judo and sambo.

Dress code in belt wrestling: shirt, pants, belt and wrestling shoes. The open skin area: head and neck: 9%, 10%: arms, the front surface of the body: 1%. In total: 20%.

Dress code in Sambo: jacket, belt, shorts, sambo-shoes. The open skin area: head and neck: 9%, arms: 2%, legs: 16%, on the front surface of the body: 1%. In total: 32%.

Dress code in wrestling: athletic tights and wrestling shoes. The open skin areas: head and neck: 9%, arms: 18%, legs: 14%, the front and rear surfaces of the body: 9%. In total: 50%.

Dress code in judo: kimono and belt. The open skin areas are head and neck: 9%, arms and feet: 4%. In total: 13%. (Please, refer to the table below).

As the table shows, the largest open skin area of the body is observed with the athletes involved in wrestling (50%), so the probability of skin infections in this group of individuals is higher than with the other types of combat.

5. Failure to comply with hygienic requirements for clean sports outfits, shoes, body. In this study we found that wrestlers do not meet the above requirements. More than half, i.e. 51.65% (40.93 - 62.26%) of the respondents said, they washed sports shoes once a month or more.

However, the respondents interviewed also noted that they put on the athletic shoes in the locker-room and go to the mat, allowing visits to toilets with the sports footwear on (68% of respondents), which is unacceptable according to hygienic standards (shoes are to be worn just before approaching the mat and to be washed at least 1 time per week). This fact increases the risk of pathogenic organisms transfer to the wrestling mat with sports shoes.

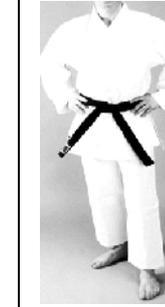
The study results showed that 58.24% (47.43 - 68.5%) of the wrestlers-respondents wash sports outfits every week, 24.18% (15.82 - 34.29%) after each workout, 15.38% (8.67-24.46%) of the respondents 1 time per month (Figure 5).

Thus, we can assume that, provided washing their uniform 1 time per week only, the wrestlers wear dirty outfits for the second time at least at two

workouts during a week, which can be a source of pathogens accumulation and transfer.

Table

Open skin areas of the athletes in different types of wrestling (percentage)

Body Parts		Belt wrestling	Sambo	Amateur wrestling	Judo
					
Head, neck		9	9	9	9
Thoracic limb	brachium	0	0	4×2	0
	underarm	4×2	0	4×2	0
	hand	1×2	1×2	1×2	1×2
Pelvic limb	hip	0	4×2	1×2	0
	leg	0	6×2	6×2	0
	foot	0	0	0	1×2
Front body surface		0,5	0,5	2	0
Rare body surface		0	0	7	0
Total		20	32	50	13

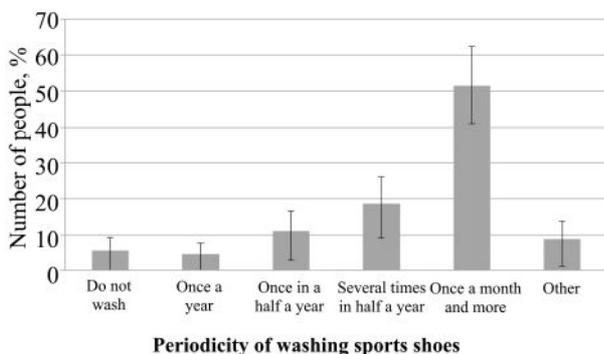


Fig. 4. Periodicity of washing sports shoes by athletes-wrestlers

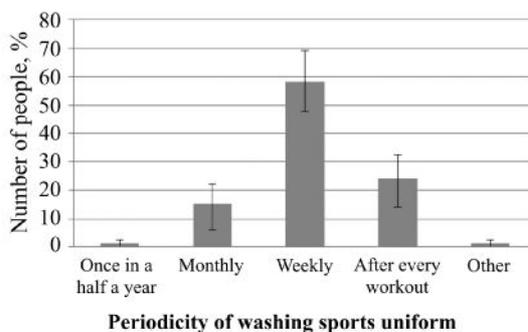


Fig. 5. Periodicity of washing sports uniform by athletes-wrestlers

In addition to the above factors, there is a problem of carpet mats cleanness during workouts and competitions. The carpet mat is not always disinfected in-between fights due to the fact that disinfectant does not have time to decay, mat remains wet and therefore slippery, which increases the risk of injury. According to the survey results, the respondents said, mats were washed much more often in the gym compared with that during the competitions (7.69% (3.15-15.21%). It should be noted that 46.15% (35.64 -56.92%) of the respondents said that carpet mat was cleaned "very often" and "often". 14.29% (7.84-23.19%) of the respondents said that the mat was cleaned, but rarely; 6.59% (2.45-13.8%) have never seen, and 24.18% (15.82-34.29%) have never paid attention to.

The second risk factors group is the mediated ones, i.e. factors that can lead to skin infections by decreasing in immunity of wrestlers. To those factors we refer: 1) environmental factors (pollution of air, drinking water, soil), creating unfavorable ecological situation of the place of residence and workouts [3]; 2) the scope and duration of physical activity; 3) regular state of stress due to frequent competitions.

The frequency of taking a shower in theory could be referred to direct factors, if athletes do not regularly take a shower after a workout. But the results of our study, under workouts 6 times a week, reveal 97% of wrestlers taking a shower at least 7 times a week. In this case, such a frequent taking a shower is a factor in reducing skin bactericidal properties that can cause skin contagion infections.

Another indirect factor may be the dietary. Wrestling relates to sports with weight categories introduced. Therefore, prior to each competition, a wrestler faces a difficult task of staying within the required weight category that is often accompanied by an affected weight reduction or gain. Grueling diet in the weeks before important competitions can cause weakening of the immune system.

Conclusions. In result of the survey, we identified risk factors for skin infectious contagions in wrestlers in training and competition processes. According to the results of the study, we may note that

the risk of skin infections in this group is high, especially for athletes involved in wrestling. The number of underwent skin infections cases among athletes-wrestlers surveyed is 9.5 times higher ($p < 0.001$) than among students not involved in professional sports. The study identified risk factors of infectious skin diseases for wrestlers in training and competitive processes: these are the direct factors (failure to comply with requirements for body hygiene, clean sportswear and shoes, wrestlers with obvious signs of infectious disease taking part in competition) and the indirect factors (regular state of stress as a result of competitions, daily workouts, intensive weight reduction or gain. etc.).

Purposely to reduce incidence of skin infections of athletes, it is extremely important to systematically inform all the participants of trainings and competitions process on the existing risks and negative consequences of their effect.

References

1. Borisevich S.A. Funkcional'nye svojstva kozhi pri zanjatijah sportom: dis. ... d-ra biol. nauk [Skin functional properties during sports: thesis ... Dr. of Biol. Sciences]. Moscow, 2015, 313 p. (in Russian).
2. Emel'janov B.A., Levando V.A., Kalinkin L.A. Klinicheskie posledstvija disbalansa mikrobnih soobshhestv v organizme sportsmenov [Clinical consequences of microbial communities disbalance in athlete organism]. *Vestnik sportivnoj nauki*, 2010, no. 3, pp. 39–43 (in Russian).
3. Zyjatdinov K.Sh., Ivanov A.V., Tafeeva E.A., Davletova N.H., Sabirzjanova G.E., Hajrullina L.M. Zdorovyj obraz zhizni kak faktor zashhity ot jekologicheskikh riskov [Healthy way of life as the factor of protection from ecological risks]. *Izvestija Samarskogo nauchnogo centra Rossijskoj akademii nauk*, 2009, vol. 11, no. 1–6, pp. 1211–1213 (in Russian).
4. Kirillova N.P., Mogilev V.E., Mezencev V.V. Izuchenie adaptacionno-immunnyh parametrov u sportsmenov s kozhnoj patologiej [Studying of adaptable and immune parameters of athletes with skin pathology]. *Uchenye zapiski universiteta im. P.F. Lesgafta*, 2012, no. 6, pp. 62–66 (in Russian).
5. Zaborova V.A., Arzumanjan V.G., Artem'eva T.A., Butovchenko L.M., Gurevich K.G., Ivkina M.V. Metod ocenki mikrobiocenoza kozhi u sportsmenov [Method for evaluating skin microbiocenosis in athletes]. *Kubanskij nauchnyj medicinskij vestnik*, 2015, no. 2 (151), pp. 69–82 (in Russian).
6. Zaborova V.A., Arzumanjan V.G., Artem'eva T.A., Gurevich K.G. Osobennosti stafilokokkovoj mikroflory kozhi u sportsmenov raznyh specializacij [Peculiarities of the skin staphylococcal microflora in athletes of different specializations]. *Kurskij nauchno-prakticheskij vestnik «Chelovek i ego zdorov'e»*, 2015, no. 1, pp. 78–82 (in Russian).
7. Popova T.V. Gigienicheskoe obsledovanie sportivnogo inventarja na sodержanie obshhij i termotolerantnyh koliformnyh bakterij [Hygienic survey of sports equipment for the maintenance of general and thermotolerant coliforms]. *Mendeleevskie chtenija*, 2015, pp. 100–101 (in Russian).
8. Rukovodstvo po skoroj medicinskoj pomoshhi [Ambulance Guide]. In: S.F. Bagnenko, A.L. Vjortkina, A.G. Mirosnichenko, M.Sh. Hubutii ed. Moscow: GJeOTAR-Media, 2010, 816 p. (in Russian).
9. Flegontova V.V., Ljapin V.P., Germanov V.T. Jetiologicheskaja diagnostika gnojno-vospalitel'nyh zabojevanij u sportsmenov-borcov [Etiological diagnosis of chronic inflammatory diseases in athletes-wrestlers]. *Pedagogika, psihologija i mediko-biologicheskie problemy fizicheskogo vospitanija i sporta*, 2004, no. 16, pp. 86–92 (in Russian).

10. Anderson B.J. Effectiveness of body wipes as an adjunct to reducing skin infections in high school wrestlers. *Clin J Sport Med*, 2012, vol. 22, no. 5, pp. 424–429. DOI: 10.1097/JSM.0b013e3182592439.

11. Wilson E.K., Deweber K., Berry J.W., Wilckens J.H. Cutaneous infections in wrestlers. *Sports Health*, 2013, vol. 5, no. 5, pp. 423–437. DOI: 10.1177/1941738113481179.

12. Estes K.R. Skin infections in high school wrestlers: a nurse practitioner's guide to diagnosis, treatment, and return to participation. *J. Am. Assoc. Nurse. Pract.*, 2015, vol. 27, no. 1, pp. 4–10. DOI: 10.1002/2327-6924.12136. Epub. 2014. Jun 9.

13. Grosset-Janin A., Nicolas X., Saraux A. Sport and infectious risk: a systematic review of the literature over 20 years. *Med. Mal. Infect.*, 2012, vol. 42, no. 11. – pp. 533–544. DOI: 10.1016/j.medmal.2012.10.002. Epub 2012. Oct. 29. Review.

14. Williams C., Wells J., Klein R., Sylvester T., Sunenshine R. Notes from the field: outbreak of skin lesions among high school wrestlers-Arizona, 2014. *MMWR Morb Mortal Wkly Rep*, 2015, vol. 64, no. 20, pp. 559–560.

15. Ahmadinejad Z., Razaghi A., Noori A., Hashemi S.J., Asghari R., Ziaee V. Prevalence of fungal skin infections in Iranian wrestlers. *Asian J Sports Med.* – 2013, vol. 4, no. 1, pp. 29–33. Epub. 2012. Sep 15.

16. Shah N., Cain G., Naji O., Goff J. Skin infections in athletes: treating the patient, protecting the team. *J. Fam. Pract.*, 2013, vol. 62, no. 6, pp. 284–291.

Davletova N.Ch., Zemlenuhin I.A., Martykanova D.S., Mugallimov S.M., Akhatov A.M. Hygienic assessment of risk factors for skin infections in athletes–wrestlers. Health Risk Analysis. 2016, no. 3, pp. 53–60. DOI: 10.21668/health.risk/2016.3.06.eng