

## INTERCOMMUNICATIONS OF INDEXES OF SPEED AND POWER QUALITIES OF SPORTSMEN SINGLE COMBAT ON THE STAGE OF THE SPECIALIZED BASE PREPARATION

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**Annotation.** The purpose of work is a study of interdependence between indexes specially-preparatory and general preparatory exercises of sportsmen (boxing, sporting hand-to-hand fight hopak, fencing). 42 sportsmen took part in researches. Statistical reliable intercommunications are set: a) indexes of force of shots by hands with the indexes of rate of single movement; b) indexes of force of shots by feet with indexes from maximal force of muscles (tractive forces); c) indexes of speed of shots by hands (pricking) with the indexes of distance of shove of balls by mass 300 gramme; d) indexes of speed of movement a step in a battle bar with indexes: speeds of shots by hands (pricking); e) indexes of frequency of shots of boxers and sportsmen hand-to-hand fight hopak with the indexes of frequency of movement (manoeuvring) on feet. Facilities which it is expedient to apply in the training process of single combats on this stage of long-term preparation are certain.

**Keywords:** boxing, force, speed, fencings, single combats, hand-to-hand hopak.

### Introduction.

Power-speed qualities are the base that determines the level of special physical preparation of athletes. Lack of development increases the duration of the formation of special skills during mastering the technique of the sport, reduces the effectiveness of competitive athletes [3, 6, 10, 14, 18, 19].

Sports fights inherent high intensity, significant mental, physical activity and emotional stress. In this regard, the role of physical training of single combat sportsmen [1, 9, 12, 15]. The results of studies of various aspects of preparation of single combat sportsmen confirmed high level of their competitive activity results dependence from the level of special physical training, in which the main aspect is to increase the effectiveness of actions [1, 2, 5, 11, 15, 19]. Methods of improving the power-speed qualities directed to improve the effectiveness of usage of specific actions covered in the scientific and technical literature in boxing [5, 9, 11, 13, 15], hand-to-hand hopak [2, 12], fencing [7, 18].

The development of power-speed qualities of single combat sportsmen due to selection effective tools and methods at each stage of long-term training remains relevant [4, 9, 14, 18, 19, 20]. Important role in this can play means of general physical training that will create a positive transfer of special physical qualities on special actions of athletes [4, 14, 17]. Analysis of scientific and methodist literature indicates that at the stage of basic specialized training of athletes topical definition of general prepared exercises and methods for their use, which positively affect the increase of special physical training athletes and mastery of technique specific actions [3, 8, 14, 18, 20-22].

Question of rationalizing of general prepared exercises use with the aim of effectively influence on the development of physical qualities of athletes is still topical, as well as the optimum correlation of general and special physical training at the stage of basic training of specialized athletes [2, 20]. Improving of single combats athletes should build on the use of a wide range of different general prepared exercises to prevent the formation of stable motor skills. This approach - the basis for improving the athletes on the stages of long-term training [14]. Experts recommend to use in training of single combats sportsmen various general developmental exercises, exercises with light and heavy athletics, the sports games. But these recommendations are based on practical experience and have no special scientific study [19]. Thus, the problem of rationalizing of physical training organization and its correction in the system of long-term training of athletes occupies an important place.

Studies were conducted according to the theme 2.9. "Personalization of training process of qualified single combat sportsmen" Consolidated Plan of scientific and research work in the field of physical culture and sports on year 2011-2015.

### Aim, task, material and methods.

*Aim of research* – to explore the relationship between performance of specially prepared and general prepared exercises of single combat athletes (boxing, sports hand-to-hand hopak, fencing) at the stage of specialized basic training.

*Tasks of research:* to determine the correlation of relationships between indicators of specially prepared and general prepared exercises of single combat athletes.

Methods of research: theoretical analysis and synthesis; chronodynamometry; teacher testing; methods of mathematical statistics

*Organization of research.* In research participated 42 single combat male athletes of first sport category and candidates for master of sports that train at the stage of specialized base preparation. There are 17 boxers, 12 athletes of hand-to-hand hopak, 13 fencers. The study was conducted at the end of the preparatory period.

After a standard warm-up [11, 13] measured the indexes of specially prepared and general prepared exercises of single combat athletes. For this purpose applied chrono dynamometr [15] to determine the strength of single punches and kicks, blows frequency and five-channel electronic chronometer [16] to determine the speed of boxers and hand-to-

hand hopak athletes bumps, velocity of armed hand of fencers (blow and injection distance 90 cm), speed of movement in combat stance step forward for a distance of 50 cm, the rate of movement of the shuttle in a combat stance step forward and a step back for a distance of 50 cm for 30 c, running speed at a distance of 6 meters.

Explosive force in general prepared exercises defined by distance parameters at which athletes can perform push balls weighing 300 g, 1 kg, 2 kg, 3 kg, 5 kg and long jump from their seats.

Maximal muscle strength (traction) is determined using torso dynamometer.

Strength endurance measured by quantitative indicators of pulling-up, bending and straightening the arms in emphasis lying, the number of sit-ups in thirty seconds time interval, the number of exercises at the push rod weighing 20 kg for 30 seconds.

On the correlation analysis is matched the general physical exercise, among which found statistically significant relationship with performance specially prepared exercises of single combat athletes, and under which the possible transfer of positive physical qualities of athletes on stage of specialized basic training.

### **Results.**

On the research results of boxers (n = 17) it is established reliable statistic relationships between indexes of such specially prepared and general prepared exercises on the stage of specialized basic training (fig. 1):

- time of single blow with the time of moving in combat position step forward ( $r = 0,533$ ;  $P < 0,05$ ), with impact force by the hand ( $r = -0,601$ ;  $P < 0,05$ ), with distance of pushing a ball weight 300 g ( $r = 0,594$ ;  $P < 0,05$ );

- time of movement in a combat stance step forward with distance of ball pushing weighing 2 kg ( $r = 0,603$ ;  $P < 0,05$ );

- frequency of attacks for 4 seconds with the frequency of movement (maneuver) on foot boat for 10 sec. ( $r = 0,585$ ;  $P < 0,05$ ), with quantitative measure of rod pushing weighing 20 kg ( $r = 0,622$ ;  $P < 0,01$ );

- frequency of movement on legs (maneuvering) with quantitative measure of rod pushing weighing 20 kg ( $r = 0,675$ ;  $P < 0,01$ );

- punching power by hands with kicking power ( $r = 0,689$ ;  $P < 0,01$ ), with distance of ball pushing weighing 300 grams ( $r = 0,593$ ;  $P < 0,05$ ), with distance indicators of pushing balls weighing 2 kg ( $r = 0,487$ ;  $P < 0,05$ ) or 1 kg ( $r = 0,554$ ;  $P < 0,05$ ), with indexes of maximal muscle force ( $r = 0,521$ ;  $P < 0,05$ ), with quantity index of dropping a bar weighing 20 kg ( $r = 0,495$ ;  $P < 0,05$ );

- distance of ball pushing weighing 2 kg with distance of ball pushing weighing 300 g ( $r = 0,516$ ;  $P < 0,05$ );

- distance of ball pushing weighing 1 kg with distance of ball pushing weighing 300 g ( $r = 0,578$ ;  $P < 0,05$ ) and 2 kg ( $r = 0,634$ ;  $P < 0,01$ );

- indicators of maximum muscle strength with distance of pushing balls weighing 300 g ( $r = 0,611$ ;  $P < 0,01$ ), 2 kg ( $r = 0,542$ ;  $P < 0,05$ ), 1 kg ( $r = 0,499$ ;  $P < 0,05$ ), and also quantity index of dropping a bar weighing 20 kg ( $r = 0,630$ ;  $P < 0,01$ );

- quantity of index of dropping a bar weighing 20 kg with distance of pushing balls weighing 300 g ( $r = 0,537$ ;  $P < 0,05$ ), 2 kg ( $r = 0,683$ ;  $P < 0,01$ ), 1 kg ( $r = 0,514$ ;  $P < 0,05$ ), with amount of extension and bending of hands with support lying ( $r = 0,583$ ;  $P < 0,05$ ), pulling on horizontal bar up ( $r = 0,522$ ;  $P < 0,05$ ), squatting for 30 sec. ( $r = 0,641$ ;  $P < 0,01$ );

- quantity index of extension and bending of hands with support lying with a number of pulling on horizontal bar up ( $r = 0,519$ ;  $P < 0,05$ ) and squatting for 30 sec. ( $r = 0,486$ ;  $P < 0,05$ ).

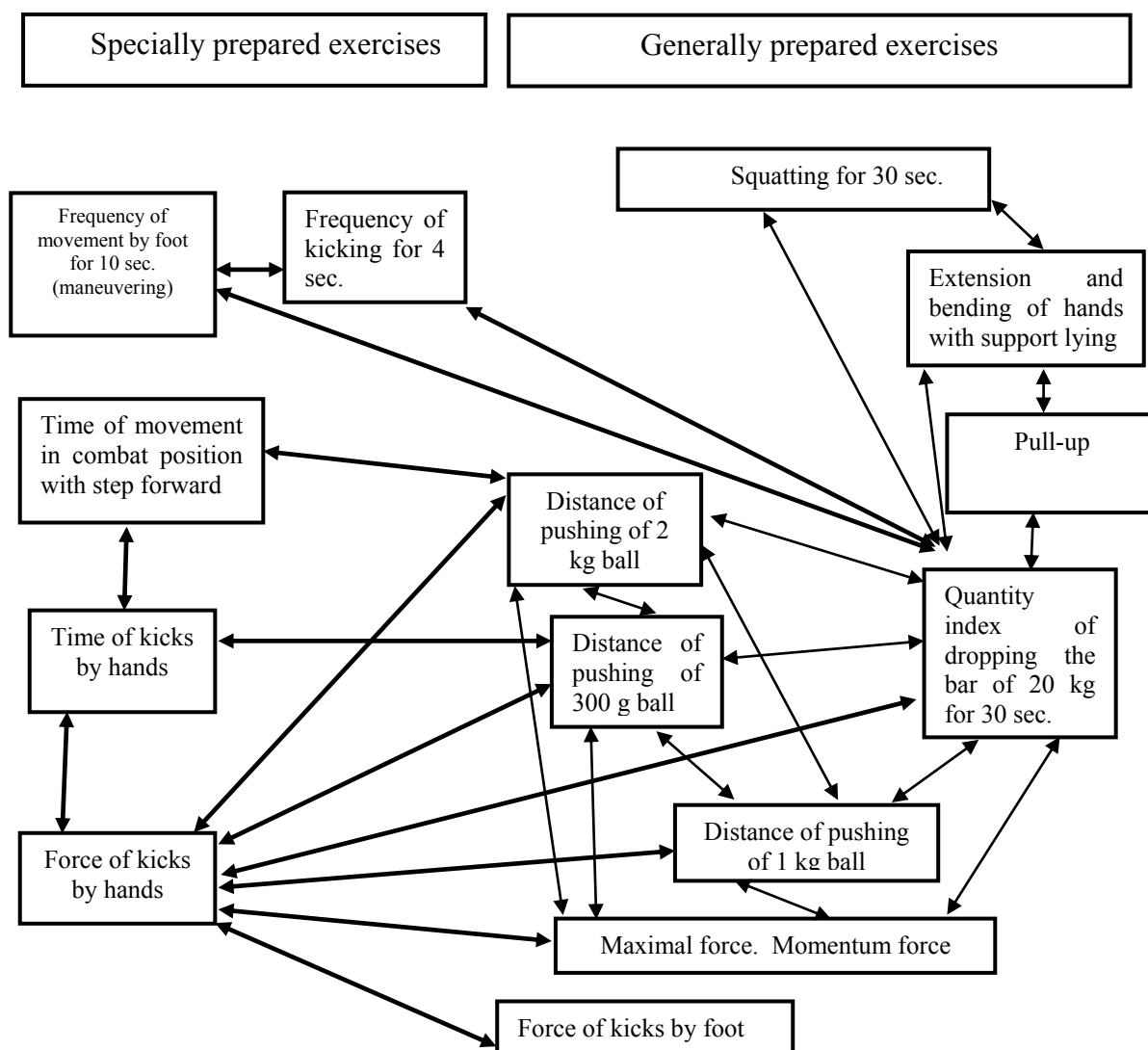


Fig. 1. Scheme correlation between indicators of specially prepared and generally prepared exercises of boxers on a stage of specialized basic training

At athletes of hand-to-hand hopak ( $n = 12$ ) are found reliable statistical relationship between indicators of generally prepared and generally prepared exercises on stage of specialized basic training (Fig. 2):

- time of single kicks by hands with distance of pushing the ball mass 300 g ( $r = 0,672$ ;  $P < 0,05$ );
- frequency of kicks by hands for 4 sec. with frequency of movement (maneuvering) on foot boat for 10 sec. ( $r = 0,631$ ;  $P < 0,05$ ), with quantity index of dropping the bar weigh 20 kg for 30 sec. ( $r = 0,588$ ;  $P < 0,05$ );
- force of kicks by hands with force of kicks by foot ( $r = 0,699$ ;  $P < 0,05$ ), with distance of pushing balls weighing 1 kg ( $r = 0,650$ ;  $P < 0,05$ ) and 2 kg ( $r = 0,663$ ;  $P < 0,05$ ), with indicators of maximum muscle strength ( $r = 0,597$ ;  $P < 0,05$ ), with quantitative measure of dropping the bar weighing 20 kg in 30 seconds ( $r = 0,588$ ;  $P < 0,05$ );
- force of kicks by foot with distance of pushing balls weighing 2 kg ( $r = 0,578$ ;  $P < 0,05$ ), with indicators of maximum muscle strength ( $r = 0,602$ ;  $P < 0,05$ );
- distance of pushing 1 kg ball with distance of pushing 300g ball ( $r = 0,579$ ;  $P < 0,05$ ) and 2 kg ( $r = 0,744$ ;  $P < 0,01$ ), with indexes of maximal muscle strength ( $r = 0,625$ ;  $P < 0,05$ ), with quantitative measure of dropping the bar weighing 20 kg in 30 seconds ( $r = 0,593$ ;  $P < 0,05$ );
- distance of pushing 2 kg ball with distance of pushing 300g ball ( $r = 0,584$ ;  $P < 0,05$ ), with indexes of maximal muscle strength ( $r = 0,590$ ;  $P < 0,05$ ), with quantitative measure of dropping the bar weighing 20 kg in 30 seconds ( $r = 0,661$ ;  $P < 0,05$ );

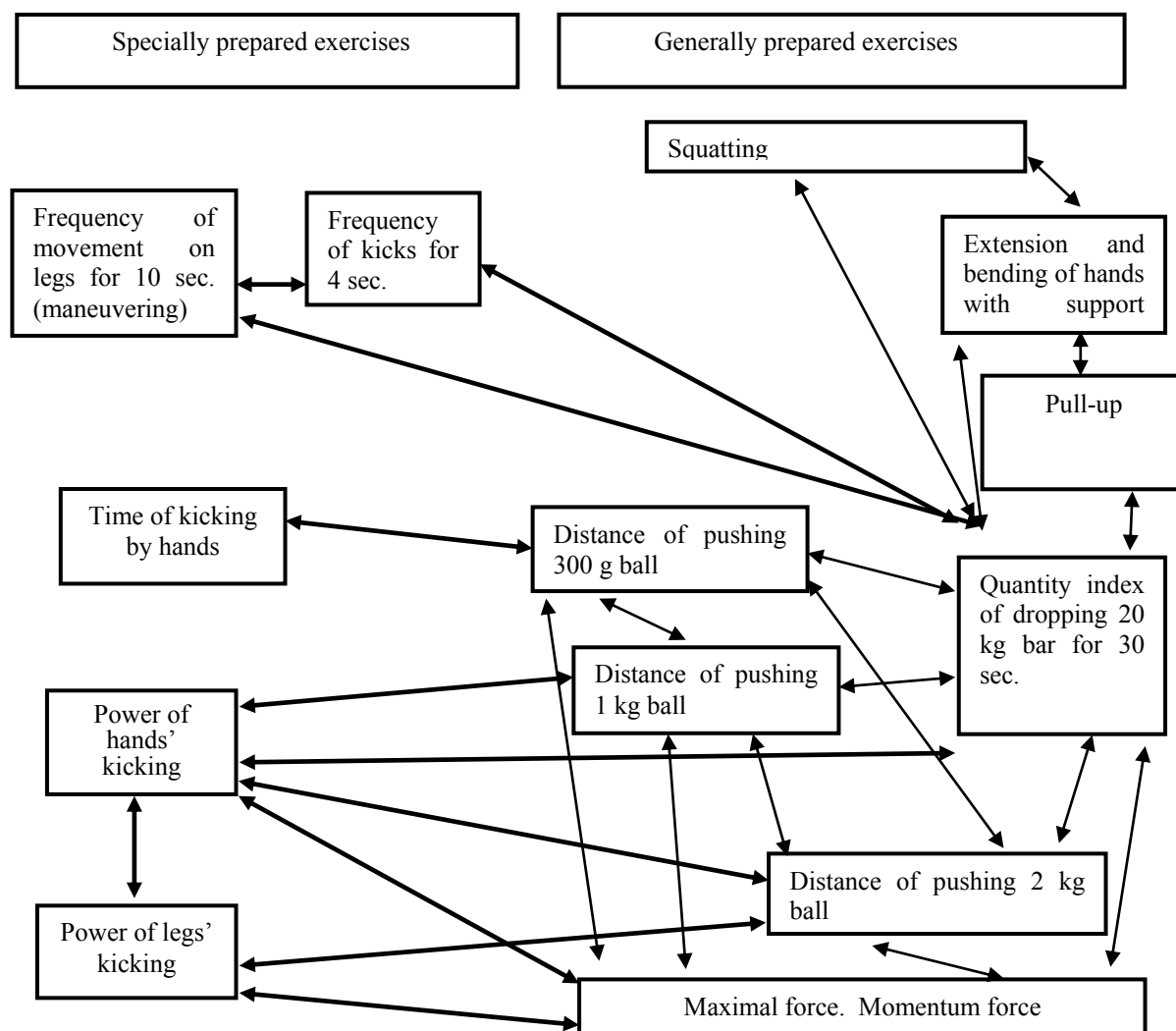


Fig. 2. Scheme of correlation between indicators of specially and generally prepared exercises of athletes of hand-to-hand hopak on stage of specialized basic training

- indexes of maximal muscles strength with distance of pushing 300 g ball ( $r = 0,622$ ;  $P < 0,05$ );
- quantity index of dropping 20 kg bar for 30 sec. with frequency of movement on foot boat for 10 sec. ( $r = 0,552$ ;  $P < 0,05$ ), with distance of pushing 300 g ball ( $r = 0,631$ ;  $P < 0,05$ ), with maximal muscle strength ( $r = 0,605$ ;  $P < 0,05$ ), with quantity of extension and bending of hands with support lying ( $r = 0,693$ ;  $P < 0,05$ ), pulling-up ( $r = 0,584$ ;  $P < 0,05$ ), squatting for 30 sec. ( $r = 0,640$ ;  $P < 0,05$ );
- quantity index of extension and bending of hands with support lying with number of pulling-up ( $r = 0,609$ ;  $P < 0,05$ ) squatting for 30 sec. ( $r = 0,577$ ;  $P < 0,05$ ).

As a result ( $n = 13$ ) it is found out reliable statistical relationship between these indicators of *specially and generally prepared exercises* on stage of specialized basic training (fig. 3):

- time of movement of attack hand (attack action) with time of movement in combat bar with step forward ( $r = 0,736$ ;  $P < 0,01$ ), with distance of pushing 300 g ball ( $r = 0,627$ ;  $P < 0,05$ );
- time of movement in combat bar with step forward with distance of pushing 2 kg ball ( $r = 0,641$ ;  $P < 0,05$ ), with quantity index of dropping 20 kg bar for 30 sec. ( $r = 0,578$ ;  $P < 0,05$ );
- power of hands' kicking with indexes of maximal muscle strength ( $r = 0,582$ ;  $P < 0,05$ ), with distance of pushing 300 g ball ( $r = 0,642$ ;  $P < 0,05$ ), 1 kg ( $r = 0,578$ ;  $P < 0,05$ ), 2 kg ( $r = 0,604$ ;  $P < 0,05$ ), 3 kg ( $r = 0,619$ ;  $P < 0,05$ ), 5 kg ( $r = 0,565$ ;  $P < 0,05$ );
- indexes of maximal muscle strength with distance of pushing 300 g ball ( $r = 0,570$ ;  $P < 0,05$ ), 1 kg ( $r = 0,669$ ;  $P < 0,05$ ), 2 kg ( $r = 0,563$ ;  $P < 0,05$ ), 3 kg ( $r = 0,634$ ;  $P < 0,05$ ), 5 kg ( $r = 0,591$ ;  $P < 0,05$ ), and also with quantity index of dropping 20 kg bar ( $r = 0,690$ ;  $P < 0,01$ );

- distance of pushing 300 g ball with distance of pushing 1 kg ball ( $r = 0,771$ ;  $P < 0,01$ ), 2 kg ( $r = 0,623$ ;  $P < 0,05$ ), 3 kg ( $r = 0,679$ ;  $P < 0,05$ ), 5 kg ( $r = 0,617$ ;  $P < 0,05$ ), and also with quantity index of dropping 20 kg bar ( $r = 0,633$ ;  $P < 0,05$ );
- distance of pushing 2 kg ball with distance of pushing 1 kg ball ( $r = 0,835$ ;  $P < 0,001$ ), 3 kg ( $r = 0,904$ ;  $P < 0,001$ ), 5 kg ( $r = 0,699$ ;  $P < 0,01$ ), and also with quantity index of dropping 20 kg bar ( $r = 0,682$ ;  $P < 0,05$ );
- distance of pushing 1 kg ball with distance of pushing 3 kg ball ( $r = 0,772$ ;  $P < 0,01$ );

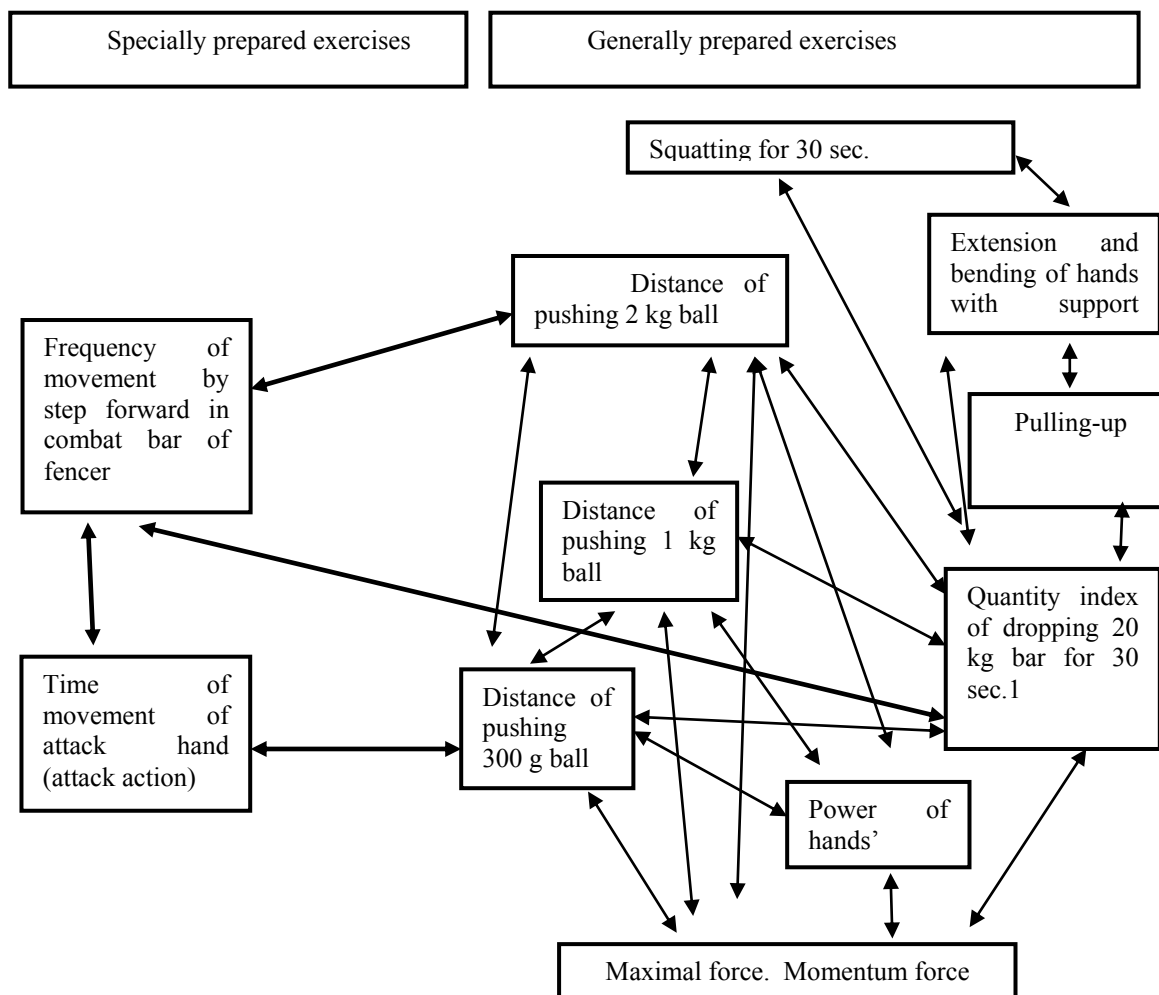


Fig. 3. Scheme of correlation between indicators of specially and generally prepared exercises of fencers on stage of specialized basic training

- distance of pushing 5 kg ball with distance of pushing 1 kg ball ( $r = 0,720$ ;  $P < 0,01$ ), 3 kg ( $r = 0,718$ ;  $P < 0,01$ ), and also with quantity index of dropping 20 kg bar ( $r = 0,617$ ;  $P < 0,05$ );
- quantity index of dropping 20 kg bar for 30 sec. with distance of pushing 1 kg ball ( $r = 0,590$ ;  $P < 0,05$ ), 3 kg ( $r = 0,631$ ;  $P < 0,05$ ), with number of extension and bending of hands with support lying ( $r = 0,562$ ;  $P < 0,05$ ), pulling-up ( $r = 0,588$ ;  $P < 0,05$ ), squatting for 30 sec. ( $r = 0,610$ ;  $P < 0,05$ );
- quantity index of extension and bending of hands with support lying with number of pulling-up ( $r = 0,611$ ;  $P < 0,05$ ) and squatting for 30 sec. ( $r = 0,556$ ;  $P < 0,05$ ).

#### Conclusion.

1. At the stage of specialized basic training of single combat athletes it is found out statistically significant relationship:

- indexes of hands' kicking with indexes of: speed single motion, force kicks, distance of pushing balls of different mass, number of dropping 20 kg bar, value of maximum force (momentum force);
- indexes of feet kicking with indexes of: power of hands' kicking, maximum muscle strength (momentum force), distance of pushing 2 kg balls;
- indexes of speed of hands' kicking with indexes of: distance of pushing 300 g balls, the speed of movement in single combat stance step forward, compensatory fluctuations between speed and power characteristics of technology of kick (the less power has kick, the higher will be speed);
- indexes of speed of movement by step in a combat bar with indexes of: speed of hands' kicking, distance of pushing 2 kg balls;

e). indexes of frequency of boxers' kicks and athletes of hand-to-hand hopak with indexes: frequency of movement (maneuver) by the legs, the number of pushing rod weighing 20 kg.

2. On a stage of basic training of single combat athletes (box, sports hand-to-hand hopak, fencing) in training process it is used specially and generally prepared exercises between which are statistic correlation relationships.

Specially prepared exercises:

- attack actions with installation of speed enforcement (box, hand-to-hand hopak, fencing);
- movement in a combat stance step forward with the installation of speed enforcement (boxing, hand-to-hand hopak, fencing);
- series of punches with a maximum frequency in the interval 4 sec. (boxing, hand-to-hand hopak);
- movement on foot boat in combat stance in the time interval 10 sec. (boxing, hand-to-hand hopak, fencing);
- punches with the installation of "fast-strong" (specially prepared exercise for boxers and athletes of hand-to-hand hopak, generally prepared exercise for fencers);
- kicks by feet with installing "fast-strong" (specially prepared exercise for athletes of hand-to-hand hopak, generally prepared exercise for boxers and fencers).

Generally prepared exercises for boxers, sportsmen of hand-to-hand hopak, fencing:

- pushing balls weighing from 300 g to 5 kg with the installation of the most greater distance;
- traction of bar with maximum force;
- dropping a bar weighing 20 kg for 30 sec. (quantitative index);
- pulling-up (quantitative index);
- extension and bending of hands with support lying (quantitative index);
- squatting for 30 sec. (quantitative index).

In further studies it is assumed to determine the appropriateness of applying certain specially and generally prepared exercises of single combat athlete with the aim to develop their physical qualities at different stages of long-term preparation, depending on the type of sport fight.

#### References:

- 1 Busol V., Roshchin I. *Moloda sportivna nauka Ukrayini* [Young sport science of Ukraine], 2005, T.3, vol.9, pp. 335-339.
- 2 Velichkovich M., Martiniuk L. *Ukrayins'kij rukopash gopak* [Ukrainian hand-to-hand hopakLviv], League-Press, 2003, 152 p.
- 3 Verkhoshanskij Iu.V. *Osnovy special'noj fizicheskoy podgotovki sportsmenov* [Bases of the special physical preparation of sportsmen], Moscow, Physical Culture and Sport, 1988, 331 p.
- 4 Volkov L. V. *Teoriia i metodika detskogo i iunosheskogo sporta* [Theory and method of child's and youth sport], Kiev, Olympic Literature, 2002, 296 p.
- 5 Degtiarev I.P. *Boks* [Boxing], Moscow, Physical Culture and Sport, 1979, 287 p.
- 6 Donskoj D. D., Zaciorskij V.M. *Biomekhanika* [Biomechanics], Moscow, Physical Culture and Sport, 1979, 264 p.
- 7 Keller V. S., Tyshler D.A. *Fekhtovanie na sabliakh* [Fencing on sabres], Moscow, Physical Culture and Sport, 1978, pp. 107 - 134.
- 8 Keller V.S., Platonov V.M. *Teoretiko–metodichni osnovi pidgotovki sportsmeniv* [Theoretical methodical bases of preparation of sportsmen], Lviv, Ukrainian sporting association, 1993, 207 p.
- 9 Klichko V.V. *Metodika viznachennia zdibnostej bokseriv u sistemi bagatoetapnogo sportivnogo vidboru* [A method of determination of capabilities of boxers in the system of a multistage sporting selection], Cand. Diss., Kiev, 2000, 18 p.
- 10 Linec' M.M. *Osnovi metodiki rozvitku rukhovikh iakostej* [Bases of method of development of motive qualities], Lviv, Shtabar, 1997, 207 p.
- 11 Nikitenko A.O. *Shvidkisno-silovi kharakteristiki serijnikh udariv u boksi ta metodika yikh udoskonalennia* [Speed-power descriptions of serial shots in boxing that method of their improvement], Cand. Diss., Kiev, 1996, 174 p.
- 12 Nikitenko A.O., Velichkovich M.R., Nikitenko A.A., Nikitenko S.A. *Pedagogika, psihologia ta mediko-biologicni problemi fizichnogo vihovanna i sportu* [Pedagogics, psychology, medical-biological problems of physical training and sports], 2007, vol.4, pp. 107 – 110.
- 13 Nikitenko S. A. *Optimizaciia shvidkisno-silovikh komponentiv tekhniki individual'nikh kombinacij udariv bokseriv na etapakh bagatorichnoyi pidgotovki* [Optimization speed-power components of technique of individual combinations of shots of boxers on the stages of long-term preparation], Cand. Diss., Lviv, 2001, 190 p.
- 14 Platonov V.N. *Sistema podgotovki sportsmenov v olimpijskom sporte* [The system of preparation of sportsmen in Olympic sport], Kiev, Olympic Literature, 2004, 808 p.
- 15 Savchin M.P. *Trenovanist' boksera ta yivi diagnostika* [Trained of boxer and its diagnostics], Kiev, Nora-pr<sup>3</sup>nt, 2003, 220 p.

- 16 Savchin M.P., Dedyk G.S., Nikitenko A.A. Universal'nyj piatikanal'nyj elektronnyj millisekundomer [Universal fivechannel electronic stopwatch]. *Elektronika i sport* [Electronics and sport], Tula, 1983, pp. 157 – 158.
- 17 Taratorin N.N. *Boks* [Boxing], Moscow, Terra-Sport, 1998, 320 p.
- 18 Tyshler D.A., Movshovich A.D. *Dvigatel'naia podgotovka fekhtoval'shchikov* [Motive preparation of fencers], Moscow, Academic Project, 2007, 153 p.
- 19 Filimonov V.I. *Boks* [Boxing], Moscow, INSAN, 2001, 400 p.
- 20 Shiriaev A.G. *Boks uchiteliu i ucheniku* [Boxing to the teacher and student], Sankt Petersburg, Shaton, 2002, 190 p.
- 21 Knapik Joseph, Darakjy Salima, Scott Shawn J., Hauret Keith G., Canada Sara, Marin Roberto, Rieger William, Jones Bruce H. Evaluation of a standardized physical training program for basic combat training. *Journal of Strength & Conditioning Research*. 2005, vol.19(2), pp. 246-253.
- 22 Sergey Ashkinazi, Wladyslaw Jagiello, RomanM. Kalina, Sergey Novikov, Romuald Stupnicki. The importance of hand-to-hand fights for determining psychomotor competence of antiterrorists. *Archives of Budo*, 2005, vol.1, pp. 8-12.

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