

RAZVIJANJE SNAGE OPŠTIM I SPECIFIČNIM METODAMA U KAJAK KANUU

THE DEVELOPMENT OF STRENGTH THROUGH GENERAL AND SPECIFIC METHODS IN KAYAKING AND CANOEING

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Sažetak: Sa razvojem kajak kanu sporta (stvaranje različitih disciplina i oblika), popularizacijom i masovnošću svjetskih razmjera, raste i konkurencija. Danas je kajak kanu uz atletiku i plivanje sportska grana sa najviše učesnika i dodjeljenih medalja (Peking, 2008 – 84 medalja) u programu Olimpijskih igara. Nastojeći da pobijede protivnike, sportisti i njihovi treneri koriste iskustva drugih veslača. Primjetna je stalna dinamika napretka sportskog rezultata. Primjenom saznanja iz oblasti medicine, fizike, biomehanike i psihologije stvorena je predstava koliko su sportska tehnika i psihofizičke sposobnosti značajni za postizanje vrhunskog rezultata. Kajak kanu, odnosno svaka od disciplina, ima svoje specifičnosti, gdje razvoj određenih oblika snage zauzima posebno mjesto. Možemo reći da je ona uz izdržljivost i brzinu prva među jednakima. Mnoštvo disciplina u kajak kanu sportu uslovalo je specijalizaciju takmičara za pojedine discipline. Koji su to oblici ispoljavanja snage bitni u kajak kanu sportu, njihove specifičnosti, koje su to metode i sredstva za njihovo razvijanje i unapređenje glavna su pitanja, koja se postavljaju pred struku i nauku.

Ključne riječi: snaga, razvijanje, opšte metode, specifične metode, kajak kanu.

Summary: With the development of canoe kayak sport (creating different disciplines and forms), and with a huge popularization of worldwide proportions, the competition is growing. Today's kayak canoe, along with athletics and swimming is the sport with the most participants and awarded medals (Peking, 2008 – 84 medals) in the Olympics. Trying to beat the opponents, athletes and their coaches use the experience of other rowers. The constant dynamic of sport results progress is notable. With the use of knowledge in the field of medicine, physics, biomechanics and psychology, it is concluded, how much sports techniques and psychophysical skills are important for achieving superior results. Rowing and each discipline has its own peculiarities, where the development of certain forms of strength takes a special place. Among the endurance and speed, strength is the first among the equals. A variety of disciplines in the kayak canoe sport, required specialized competitors for each discipline. Major issues facing the profession and science are which forms of power manifestation are essential in kayak canoe sport, their peculiarities, and which methods and exercises are essential for their development and improvement.

Keywords: strength, development, general methods, specific methods, kayak canoe.

UVOD

Postoje brojne definicije snage. "Snaga sportista se može definisati i kao sposobnost sportista da se suprotstavi i savlada djelovanje spoljašnjih sila ili različite varijante otpora. Sportista se suprotstavlja delovanju sljedećih spoljašnjih sila: inerciji sportskih rekvizita, inerciji sopstvenog tijela (tjelesnoj težini), sili

INTRODUCTION

There are numerous definitions of strength. "The strength of athletes can also be defined as the ability of an athlete to confront and overcome the effects of external forces or various forms of resistance. Athlete opposes the action of the following external forces: inertia of sports equipment, the inertia of their body (body weight), the force of friction, the

trenja, sili zemljine teže i otporu elastičnih sila rekvi- zita“ (Stojanović i sar., 2009, 172). Najčešća podjela snage je na maksimalnu (apsolutnu i relativnu), repetitivnu i eksplozivnu. Razlikujemo statičku i dinamičku snagu, te prema angažovanim dijelovima tijela, snagu ruku i ramenog pojasa, nogu, trupa (Herodek, 2006).

Da bi se povećala brzina čamca potrebno je smanjiti otpor i povećati silu. Ako se otpor vode na trup čamca svede na minimum, jedino preostaje povećanje snage veslača. Snaga igra važnu ulogu u postizanju vrhunskog rezultata. Gotovo je nemoguće ostvariti uspjeh bez izuzetne fizičke pripremljenosti. Prilikom zaveslaja se vrši rad, djelujući silom mišića na veslo na određeno rastojanje u određenom vremenu, gde su mišićna sila i brzina kontrakcije mišića obrnuto proporcionalne (Stojanović i sar., 2009).

U kajaku i kanuu sila jednog zaveslaja može da iznosi 16-35 kg zavisno od discipline, čamca (kajak, kanu) i pola. Najjača sila se ispoljava u startu, te u periodima ubrzavanja. Nakon ubrzanja sila opada na približno 20 kg kajak ili 25 kg kanu (Adisson, 2000). Veslač za održavanje brzine koristi određenu frekvenciju zaveslaja (50-160 zaveslaja u minuti) zavisno od discipline, čamca i dijela staze (Endicott, 1980). Različiti oblici snage su zastupljeni više ili manje zavisno o kojoj fazi trke, disciplini i čamcu je riječ. U kajaku i kanuu riječ je o dinamičkoj snazi.

Maksimalna snaga najznačajniju ulogu ima na startu. Tada je potrebno u što kraćem roku čamac ubrzati od nule do maksimalne brzine. Takođe, bitno je koliko maksimalne snage veslač uloži u svaki zaveslaj. Jači veslač može održati istu frekvenciju zaveslaja koristeći duže veslo i sa lopaticom veće površine. Kod takmičara istih tehničkih kvaliteta više će ubrzavati onaj koji ima veću mišićnu snagu. Koliko je utrošene snage uloženo u pokret veoma zavisi od tehnike veslača (Endicott, 1983). Kada je riječ o maksimalnoj snazi u kajak kanu sportu, bitnija je relativna maksimalna snaga (snaga veslača u odnosu na njegovu kilažu). Teži veslač više uroni čamac. Time se povećava i do- dirna površina sa vodom i raste otpor vode na čamac. Taj veslač mora utrošiti više snage da bi postigao istu brzinu kao lakši veslač. Maksimalna snaga nešto veći značaj ima u brzim disciplinama (kraćim stazama).

Repetitivna snaga ili snaga ponavljanja ima ciklički karakter ispoljavanja. Za nju je karakteristično smjenjivanje naprežanja i opuštanja mišića. Često se ne može naći granica između repetitivne snage i izdržljivosti u snazi. Neki autori sve aktivnosti koje uključuju ispoljavanje snage do 30% maksimalne snage,

force of gravity and the force of elastic resistance of equip- ment“ (Stojanović et al., 2009, 172). The most frequent divi- sion of strength is into maximal strength (absolute and rela- tive), repetitive and explosive. We can distinguish between static and dynamic strength, and also strength based on the engaged parts of the body, arm strength and strength of the shoulder belt, leg strength and torso strength (Herodek, 2006).

In order to increase the speed of the kayak or canoe it is necessary to decrease the resistance and increase the force. If the resistance of the water on the body of the boat is reduced to a minimum, the only thing left is an increase in the strength of the rower. Strength plays an important role in achieving top re- sults. It is almost impossible to achieve success without excep- tional physical fitness. During the rowing is made work, who acts with the muscle force on the paddle at a certain distance in a certain time, where the muscle force and speed of muscle contraction are inversely proportional (Stojanović et al., 2009).

In the kayak and the canoe the force of one row can be up to 16-35 kg depending on the discipline, type of vessel (kayak, canoe) and gender. The greatest force is manifested at the start, and thus in the periods of acceleration. Following ac- celeration, the force decreases to approximately 20 kg for the kayak or 25 kg canoe (Adisson, 2000). The rower, in order to maintain the speed, uses a certain stroke frequency (50-160 strokes per minute) depending on the discipline, boat and part of the course (Endicott, 1980). Different forms of strength are manifested to a greater or smaller extent depending on the phase of the race, discipline and boat. In the case of the kayak or canoe we are dealing with dynamic strength.

Maximal strength is most significant at the start. Then it is necessary to speed up the boat as soon as possi- ble from zero to the maximal speed. In addition, the extent of the maximal strength a rower invests into each stroke is also important. A strong rower can maintain the same stroke frequency using a longer oar and with a greater paddle. Among competitors with the same technical quali- ties, the stronger of the two can row quicker. The amount of energy that is spent in the movement depends greatly on the rower's technique (Endicott, 1983). In the case of maximal strength in kayaking and canoeing, what is more important is the relative maximal strength (the strength of the rower in relation to his weight). A heavier rower can make the boat sink deeper into the water. This also increases the contact surface with the water and the resis- tance of the water on the boat increases. This rower has to invest more strength in order to achieve the same speed as a lighter rower. Maximal strength has a somewhat greater significance in quicker disciplines (short distances).

Repetitive strength or the strength used for repetition is of a cyclical character. What characterizes it is the alternation

smatraju izdržljivošću u snazi (Herodek, 2006). Sve preko te granice smatraju repetitivnom snagom. Drugi poistovjećuju ova dva termina. Na osnovu metaboličkih režima djelovanja (Szanto, 2003) repetitivnu snagu dijeli na aerobnu i anaerobnu i ovdje se vidi bliska veza sa sposobnosti izdržljivosti pa repetitivnu snagu još i zovu izdržljivost u snazi. „Sposobnost izdržljivosti snage označava se kao sposobnost otpora umoru organizma kod dugotrajnih učinaka snage.“ (Harre i sar., 1979 prema: Lenz, 2003, str. 39).

Eksplzivna snaga je značajna, prije svega, prilikom ubrzavanja čamca ili povećavanja frekvencije zaveslaja (start i finiš). To igra posebnu ulogu kod sprinterskih disciplina te u slalomu.

Iz prethodnog se može uočiti da su sve tri vrste snage bitni dijelovi veslačevog fizičkog profila i treba posvetiti pažnju razvijanju svake od njih.

RAZVIJANJE SNAGE

Kako se povećanjem snage povećava i brzina, razvoju snage se treba posvetiti posebna pažnja. Zato je u pripremnom periodu trening snage zastupljen 30-50% od ukupnog vremena treninga. Mehanizam prilagođavanja mišića na trening sile i snage je hipertrofija mišića, odnosno povećanje poprečnog preseka mišićnih vlakana (Stojanović i sar., 2009). Da bi mišići ojačali potrebno im je dati odgovarajući stimulans (trening, vježba). Ako se primijeni adekvatan trening u periodu od 8-10 sedmica dolazi do hipertrofije mišića. Mišić hipertrofira tako što se povećava: broj miofibrila po mišićnom vlaknu, kapilarna gustoća po mišićnom vlaknu, količina proteina i ukupan broj mišićnih vlakana (Nikolić, 2003).

Od značaja je intenzivno i konstantno razvijati snagu, od puberteta pa tokom čitave sportske karijere. Pri tome, trening snage se razlikuje u zavisnosti koju vrstu snage je potrebno razvijati, od uzrasta, perioda sezone, građe i kvaliteta sportiste. U uzrasnoj dobi od 11-14 godina djeca su u senzibilnoj fazi za razvoj sna-

between contractions and relaxations of the muscles. The line between repetitive strength and endurance is often difficult to determine. Some authors consider all the activities which include the manifestation of strength up to 30 % 1RM endurance in strength (Herodek, 2006). Anything over that limit is considered repetitive strength. Other authors equate the two terms. On the basis of the metabolic regimes of activity (Szanto, 2003) repetitive strength is divided into aerobic and anaerobic strength and here we can see a close connection with endurance, so repetitive strength is also known as endurance in strength. “The ability to maintain strength is known as the ability to resist fatigue of the body over longer strength exertion.” (Harre et al., 1979 in: Lenz, 2003, pg. 39).

Explosive strength is significant, primarily, during the increase in the speed of the boat or the increase in the frequency of the strokes (the start and finish). It plays an important role among sprinting athletic disciplines and thus in the slalom as well.

From the abovementioned we can note that all three types of strength are very important parts of the rower’s physical profile and attention should be paid to the development of each of them.

STRENGTH DEVELOPMENT

With the increase of strength and speed increases, the development of strength requires a lot of attention. For that reason, during the preliminary period, strength training makes up 30-50 % of the total training time. The muscle adaptation mechanism to strength training and force is muscle hypertrophy, that is, the increase in the cross-section of the muscle fibers (Stojanović et al., 2009). In order for the muscles to become stronger, they should be given the appropriate stimulus (training, exercise). If adequate training is applied in a period from 8-10 weeks, muscle hypertrophy occurs. The muscle hypertrophies with the increase in the number of myofibrils in the muscle fiber, capillary density per muscle fiber, the amount of protein and overall number of muscle fibers (Nikolić, 2003).

What is important is to intensively and constantly de-

Tabela 1. Faktori uticaja u treningu snage (Harre, prema: Lenz, 2003, 89)

Vježbe / Exercises	Obim opterećenja / Volume of load
opšte namijene	broj ponavljanja po seriji
specijalne vježbe	ukupni obim (broj) vježbi
takmičarske vježbe	ukupni obim svih vježbi po jedinici treninga, u sedmici,
/ general purpose	periodu, godini trajanje kontrakcije
special exercises	/ number of repetitions per set
competitive exercises /	the total volume (number) of exercises
	the total volume of exercises per unit training, of the week,
	period, year
	duration of contraction /

Table 1. The factors that influence strength training (Harre, in: Lenz, 2003, 89)

Intenzitet opterećenja / Intensity of load	Od značaja je / Also importance is
dodatni teret	fizički razvoj
frekvencija vježbanja	ukupni trening
brzina kontrakcije	redosljed vježbi
trajanje pauze	dinamika opterećenja
učestalost treninga	/ physical development
/ additional burden	total training
frequency of exercise	order of exercises
speed of contraction	dynamics of loads /
pause duration	
training frequency /	

ge. U tom periodu upotrebljavaju se samo vježbe za savladavanje sopstvene tjelesne težine. U periodu 15-19 godine postepeno se povećava intenzitet vježbi, uz primjenu dodatnog opterećenja, ali veoma oprezno da bi se izbjeglo preveliko opterećenje kičmenog stuba. Snagu treba razvijati prvo opštim, pa tek onda specifičnim sredstvima.

SREDSTVA TRENINGA ZA RAZVIJANJE SNAGE

Osnovno sredstvo svakog treninga je vježba. U kajak kanu snagu razvijamo vježbama opšte i specifične namjene. Trening snage opštim i specifičnim sredstvima ne isključuju jedan drugi, već se nadopunjuju i čine jedinstvenu cjelinu u pripremnom periodu veslača.

Trening snage opštim sredstvima se najčešće realizuje opštim vježbama snage sa dodatnim opterećenjem, čime se stvara podloga za kasnije razvijanje specifične snage. Prilikom odabira vježbi potrebno je obratiti pažnju na: vrstu snage (maksimalna, eksplozivna, repetitivna), ciljanu mišićnu grupu (opterećenje 2-3 grupe mišića na jednom treningu), vrstu (da li angažuju iste ili različite grupe mišića) i broj vježbi (4-12 vježbi po treningu), intenzitet ili težinu tegova, broj ponavljanja, serija i odmora između njih, učestalost treninga u toku sedmice (4-7 puta) i ukupno trajanje trenažnog ciklusa razvijanja snage.

METODE TRENINGA ZA RAZVIJANJE SNAGE

Metode su načini kako se koriste opterećenja za razvijanje snage. Izbor metoda u kajak kanu sportu zavisi od adekvatnosti opterećenja za svakog veslača. Osnovni kriterijumi su: da metoda mora da podstiče funkciju CNS-a koja odgovara kajak kanu sportu i funkciji mišića u tom sportu, da regulišu broj uključenih mišića u mišićnom kinetičkom lancu koji se koristi u tehnikama veslanja, da se ne remeti unutarnja i međumišićna koordinacija veslača, da se usklade njihove tjelesne karakteristike i antropomotoričke sposobnosti i da vježbanje bude usklađeno sa tehnikama veslanja. U praksi se najčešće koriste: 1. metod maksimalnih naprezanja (opterećenja od 1RM i više), 2. metod submaksimalnih naprezanja (opterećenja od 90-95 % od 1RM i više), 3. metod ponavljanja istog opterećenja, 4. metod mjenjanja opterećenja i 5. dinamičke metode (doziranje sa doziranom brzinom kretanja).

Metode za razvijanje maksimalne snage: Razvijanje maksimalne snage zahtjeva veći intenzitet u

velop strength, starting from puberty and during the entire course of one's sports career. At the same time, strength training differs depending on the type of strength which should be developed, the age, phase of the competitive season, build and quality of the athlete. At the age of 11-14 children are in the sensitive phase of strength development. During that period only exercises meant for overcoming own body weight are used. In the period between the ages of 15-19 the intensity of the exercise increases gradually, with additional weight, but very carefully so that excessive load on the spinal column can be avoided. The development of strength should start first with general, and then with specific exercises.

MEANS OF DEVELOPING STRENGTH THROUGH TRAINING

The basic means of every training is exercise. In canoeing, we develop strength through general and specific exercises. Strength training through general and specific means does not exclude one another, but complement each other and form a single unit in the rower's pre-season training.

Strength training through general means is usually carried out through general exercises with the additional weight, and they are used to create the basis for the development of specific strength. When choosing exercises it is necessary to pay attention to: the type of strength (maximal, explosive, repetitive), the focus muscle group (2-3 groups of muscles during one training session), the type (whether the same or different groups of muscles are involved) and number of exercises (4-12 exercises per training session), the intensity of the load or the weight of the weights, the number of repetitions, series, rests between them, the frequency of the training session per week (4-7 times a week) and the overall duration of the training cycle to develop strength.

STRENGTH TRAINING METHODS

Methods are ways to use loads to develop strength. The choice of methods in kayak canoe sport depends on the adequacy of the load for each rower. The main criteria are: that the method must stimulate the function of the CNS which corresponds to kayak canoe sports and muscle function in that sport, to regulate the number of involved muscles in the muscle kinetic chain used in rowing techniques, to not disturb the internal and intramuscular coordination of rowers, to align their physical characteristics and motoric skills and that practicing is compatible with the rowing techniques. In practice, the most commonly used are: 1. method of maximum load (load of 1RM and above), 2. method of submaximal load (load of 90-95% of 1RM and above), 3. method of repeating

vježbama. Postoje dvije različite metode razvoja maksimalne snage: a) Metoda visokog ili maksimalnog napreznja sa intenzitetom od 80-100% uz najbržu izvedbu, 1-4 ponavljanja i 5-8 serija i b) Metoda umerenog napreznja sa intenzitetom od 60-80% od maksimalne snage, 8-15 ponavljanja i 4-8 serija. Najčešće se koristi metoda serija, piramidalna ili polupiramidalna metoda, a rade se vježbe za 2-3 grupe mišića. Vrijeme odmora između serija može biti 3-5 minuta, a 36-48 sati između dva treninga maksimalne snage.

Metode za razvijanje eksplozivne snage: Koristi se metoda maksimalnih napreznja sa intenzitetom od 50-70% maksimalne snage, uz izvođenje pokreta maksimalnom brzinom. Radi se 6-12 ponavljanja i 4-6 setova. Odmor između setova je 3-5 minuta, između dva termina treninga 24-48 sati.

Metode za razvijanje repetitivne snage: Koristi se metoda umerenog napreznja sa intenzitetom od 20-60% maksimalne snage. Izvodi se veliki broj ponavljanja 15-60 ili više u svakoj seriji. Ukupan broj ponavljanja svake vježbe na jednom treningu može biti i 100-300. Odmor između serija je od 30 sekundi do 2 minuta, između termina treninga 6-24 sata. Za organizaciju se najčešće koristi kružni trening.

Najvažnije grupe mišića koje se angažuju u kajak kanu sportu su: a) musculus deltoideus - pars acromialis; b) musculus triceps brachii; c) m.trapezius; d) m.biceps brachi; e) m.rectus abdominis; f) m.latissimus dorsi; g) m.pectoralis major i h) m.obliquus externus abdominis.

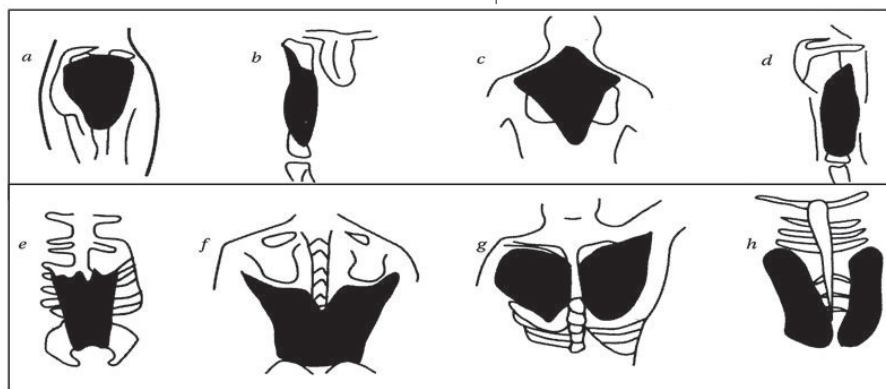
the same load, 4. method of changing load and 5. dynamic methods (dosing with dosed speed of movement).

The methods for development of maximal strength: Maximal strength generally requires greater exercise intensity. There are two different methods of the development of maximal strength: a) The method of high or maximal load with 80-100% intensity with the fastest execution, 1-4 repetitions and 5-8 series and b) The method of moderate load with 60-80% intensity of 1RM, 8-15 repetitions and 4-8 series. The method most frequently used is the method of series, the pyramid or semi-pyramid method, and the exercises include 2-3 groups of muscles. The rest period between the series can be 3-5 minutes, with 36-48 hours between two training sessions of maximal strength.

The methods for development of explosive strength: We use the method of maximal load with the intensity from 50-70% of 1RM, with a maximum speed movement. A total of 6-12 repetitions and 4-6 sets are completed. Each exercise is performed at maximal speed. The rest period between the sets is 3-5 minutes, and 24-48 hours between two training sessions.

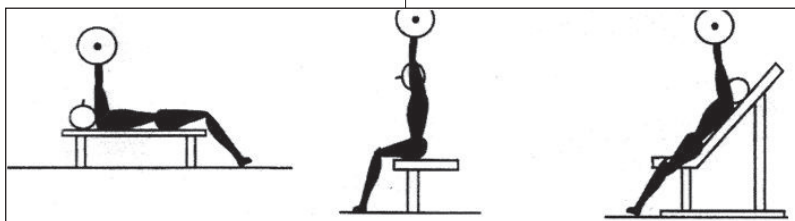
The methods for development of repetitive strength: We use the method of moderate load with 20-60% intensity of 1RM. It is a case of multiple repetitions 15-60 or more in each series. The overall number of repetitions of each exercise during one training sessions can be between 100 and 300. The break between the series is from 30 seconds to 2 minutes, and between the training sessions 6-24 hours. The most frequently used form of training is circular training.

The most important groups of muscles used in kayaking or canoeing include: a) m.deltoideus - pars acromialis; b) m.triceps brachi; c) m.trapezius; d) m.biceps brachi; e) m.rectus abdominis; f) m.latissimus dorsi; g) m.pectoralis major and h) m.obliquus externus abdominis.



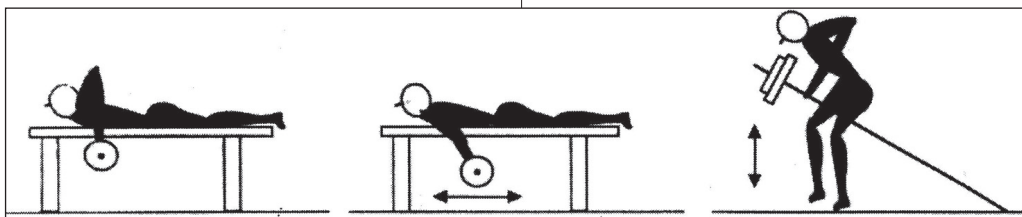
Primjer vježbi sa tegovima

Examples of weight exercises



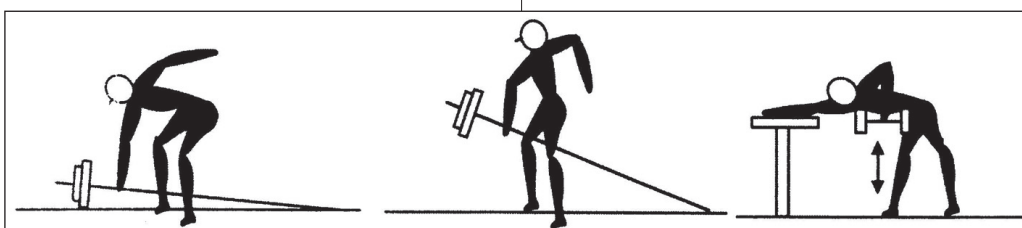
Slika 2. bench press (potisak sa klupe), sit press (potisak u sjedećem položaju, kosi bench press ugao 45°

Figure 2. the bench press, sit press, diagonal bench press at an angle of 45°



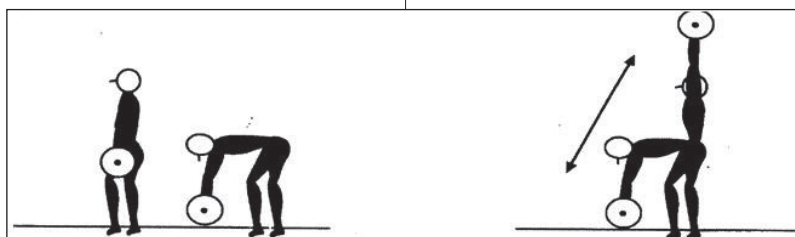
Slika 3. bench row privlačenje sa klupe, ljuljanje, "T" šipka

Figure 3. the bench row, rocking, the T-bar



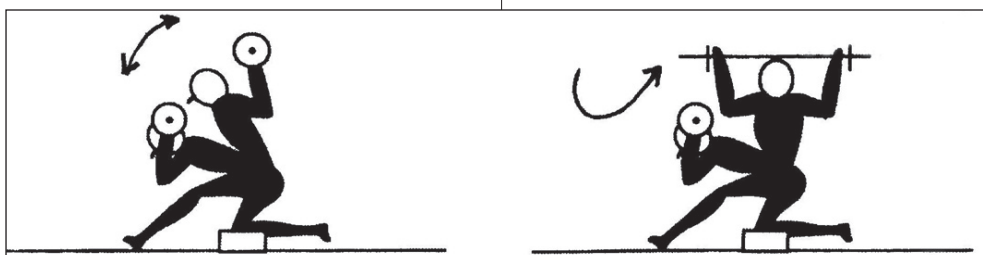
Slika 4. jednoručno dizanje tega sa podizanjem trupa

Figure 4. one-arm weight lifts with torso lifts



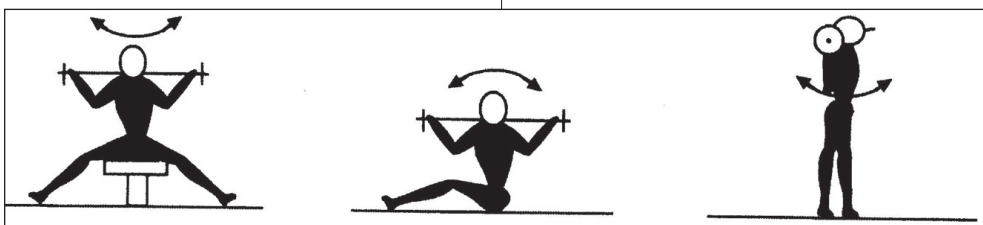
Slika 5. izbačaj tega

Figure 5. weight thrust-ers



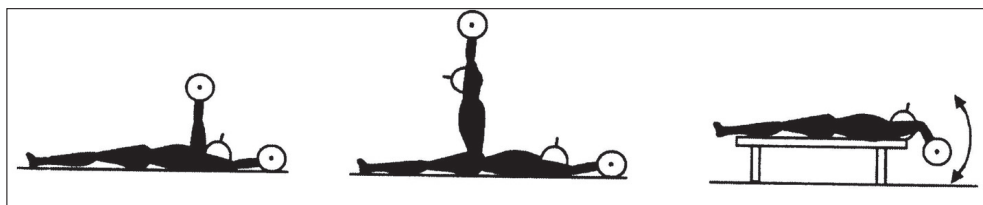
Slika 6. podizanje i rotiranje trupa

Figure 6. torso lifts and rotations



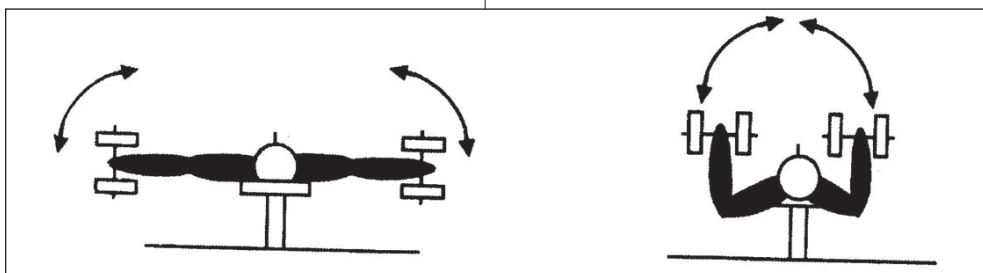
Slika 7. rotiranje trupa sa tegovima u sjedećem ili stojećem položaju

Figure 7. torso rotations with weights in the seated or standing position



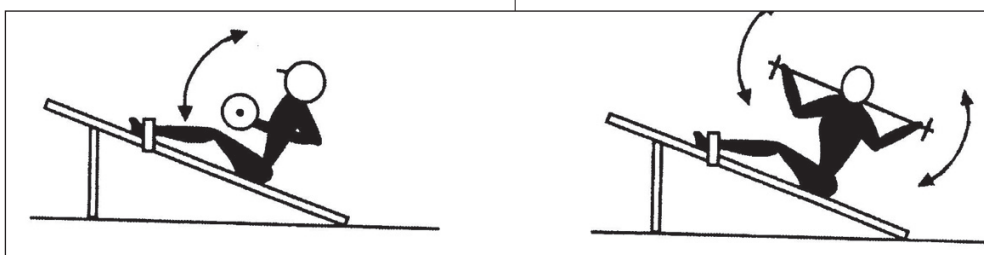
Slika 8. dizanje i spuštanje tegova iza glave ili podizanje u sjedeći položaj

Figure 8. lifting and lowering weights behind the head or lifts in the seated positions



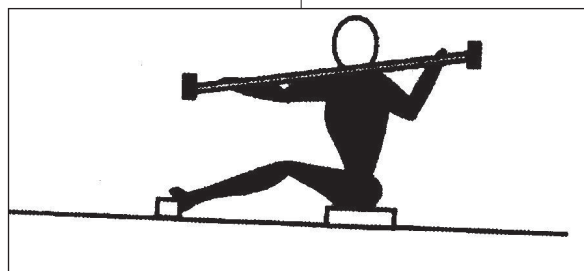
Slika 9. "letenje" sa ispruženim ili savijenim rukama – bućicama

Figure 9. "flying" with arms outstretched or bent – barbells



Slika 10. podizanje i rotiranje trupa sa tegovima - na kosini

Figure 10. torso lifts and rotations with weights - at an angle

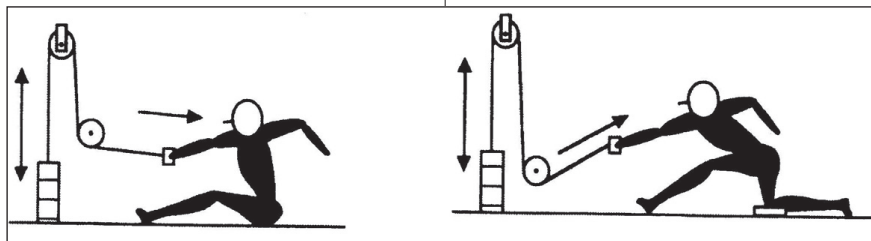


Slika 11. simulacija kajakaških pokreta sa bućicama ili tegovima

Figure 11. the simulation of kayak movements with barbells or weights

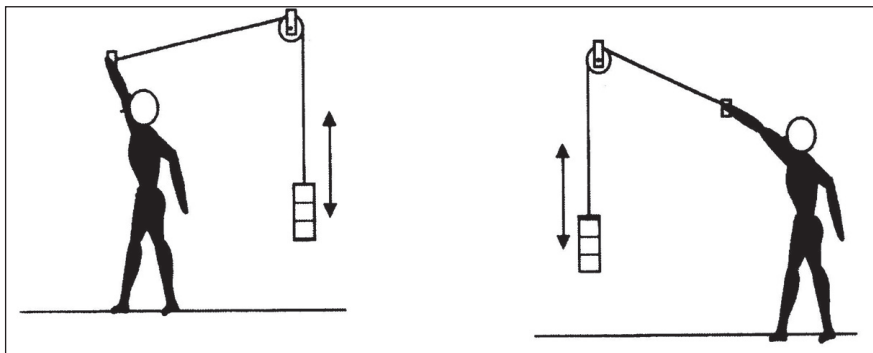
Primjer vježbi sa spravama

Examples of exercises with props



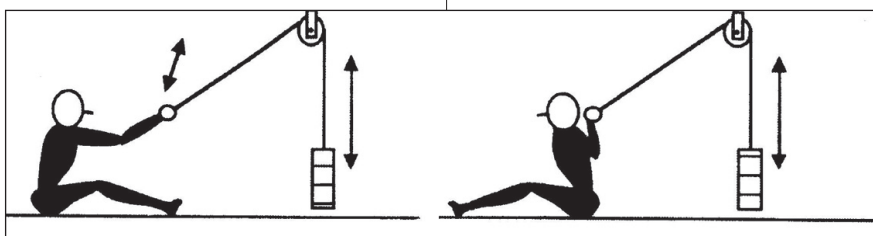
Slika 12. privlačenje ispruženom rukom sa rotacijom trupa ili dvoručno veslanje

Figure 12. drawing in an extended arm with torso rotations or the double-handed row



Slika 13. privlačenje iznad glave jednom rukom (ispred ili iza tijela)

Figure 13. drawing above the head with one arm (in front of or behind the body)



Slika 14. povlačenje prema dole (ispred ili iza glave)

Figure 14. drawing downwards (in front of or behind the head)

Za trening snage bitno je naglasiti da su intenzitet i obim opterećenja u obrnutom odnosu:

Intenzitet (max:%)	Broj ponavljanja
95-100	1-2
90-95	2-3
85-90	4-5
80-85	6-8
75-80	8-12
70-75	12-15
60-70	15-20
50-60	20-30

Često se jednim treningom snage ‘prepliću’ razvoj maksimalne, eksplozivne i repetitivne snage.

Tabela 2. Sažeta tabela modaliteta treninga (Szanto, 2003)

efekat treninga / Effect of training /	intenzitet tereta % / Intensity of burden %	ponavljanja u seriji / Repetition in series	broj serija / Number of series	odmor minuta / Break minute	brzina pokreta / Speed of movement
maksimalna snaga / maximal strength /2 metode/ /2 methods/	85 – 100 60 – 80	1 – 6 8 – 15	5 – 8 4 – 6	3 – 5 3 – 5	optimalna / optimal tečna / fluent
eksplozivna snaga / explosive strength eksplozivan / eksplozivne brzi / fast	50 – 70 30 – 40	6 – 12 8 – 15	4 – 6 4 – 6	3 – 5 3 – 5	brzi / fast brzi / fast
repetitivna snaga / repetitive strength anaerobni režim / anaerobic regime aerobni režim / aerobic regime	40 – 60 20 – 40	15 – 20 30 – 80	4 – 8 5 – 10	1 – 2 30" – 1'	optimalna / optimal mala / low

Trening snage specifičnim metodama stvara pretpostavku da se kondicijske osnove stvorene opštim treningom snage mogu pretvoriti u takmičarski pokret. Sredstvima specijalnog treninga pripadaju trening na

For strength training it is important to point out that the intensity and extent of the load are inversely proportional:

Intensity (max:%)	Number of repetitions
95-100	1-2
90-95	2-3
85-90	4-5
80-85	6-8
75-80	8-12
70-75	12-15
60-70	15-20
50-60	20-30

It is often the case that during one strength training session, the development of maximal, explosive and repetitive strength ‘overlap’.

Tabela 2. A concise table of the modality of training (Szanto, 2003)

Strength training with specific methods creates the assumption that the fitness basics created through general strength training can be transformed into competitive movement. The means of special training include water

vodi i veslanje na povlačnoj spravi. Specijalne vježbe svojom prostorno-vezenskom i dinamičkom strukturom pokreta (vrijeme – snaga), grupama mišića koji su u pokrete uključeni, ne smiju odstupati od takmičarske strukture zaveslaja.

Tabela 3. Promena intenziteta opterećenja u treninzima u odnosu na promjenu otpora

Dodatni otpor	Smanjeni otpor
dodatna težina u čamcu	veslanje nizvodno,
veslanje sa kočnicom	veslanje u valu bržeg čamca,
veslanje u plitkoj vodi	kraće veslo,
veslanje uzvodno	manja lopatica.
duže veslo	
veća lopatica	
teže veslo	

Najpopularnija **metoda za razvijanje specifične snage** je svakako veslanje sa kočnicom. Nije dobro koristiti prejaku kočnicu jer to može smanjiti frekvenciju zaveslaja. Dovoljno je da se na trup čamca pričvrsti predmet koji će ga kočiti (konop, limenka, kožni remen, teniska loptica). Među veslačima su svakako najpopularniji gumeni tregeri za vezivanje čamaca (lako se pričvrste). Druga jednako popularna **metoda za razvijanje specifične snage** je veslanje u opterećenom čamcu (5-15 kg). Nedostatak ove metode je to što mijenja ravnotežu čamca (čamac je stabilniji), pa se gubi osjećaj. Dobra strana je to što se poboljšava osjećaj prijenosa snage.

Specifične metode treninga se mogu primijenjivati u svim periodima sezone, ali se najčešće koristi u predtakmičarskom i takmičarskom periodu. U predtakmičarskom periodu trening je ekstenzivan (interval duži od 1 min, vrijeme veslanja 20-45 min.). U takmičarskom periodu trening je intenzivan (interval 10-60", vrijeme veslanja 5-15 min.). Najbolji rezultati se postižu intervalima maksimalnog intenziteta. Vrijeme trajanja ove vrste treninga bi trebala biti 10-30% ukupnog vremena veslanja. U glavnom takmičarskom periodu (zbog pada brzine) izbjegava se primjena ovog treninga nekoliko dana prije takmičenja. Za specifični trening u zatvorenom se koristi kajak ili kanu ergometar. Trening je isti kao na vodi.

Vrhunski veslači u treningu snage moraju imati više treninga specifične nego opšte snage.

training and machine rowing. Special exercises with their spatio-temporal and dynamic structure of movement (time – strength), the groups of muscles which are included in the movement, cannot deviate from the competitive structure of the stroke.

Table 3. Changes in the intensity of the load during training in relation to the change in resistance

Additional resistance	Reduced resistance
additional weight in the boat	downriver rowing
rowing with a stop mechanism	rowing in a wave of faster boat
rowing in the shallow water	shorter paddle
upriver rowing	smaller blade
longer paddle	
greater blade	
harder paddle	

The most popular **method for specific strength development** is certainly rowing with a stop mechanism. It is not good to use a stop that is too strong since it can decrease the frequency of the strokes. It is sufficient that the hull of the boat is fastened to an object which will hold it (rope, a tin can, a leather belt, a tennis ball). Among the rowers the most popular ones are rubber suspenders for binding the boat (they are easily fastened). The second equally popular **method for specific strength development** is rowing in a loaded boat (5-15 kg). The shortcoming of this method is that it alters the balance of the boat (the boat is more stable), and so any feeling is lost. The good thing is that it improves the feeling of strength transfer.

Specific method of training can be used in all phases of the competitive season, but is most often used in the pre-competitive and competitive period. In the pre-competitive season the training is extensive (an interval longer than 1 min, rowing time 20-45 min.). In the competitive period training sessions are intense (the interval is 10-60", the rowing time 5-15 min.). The best results are achieved during the intervals of maximal intensity. The duration of this type of training should be between 10-30% of the overall rowing time. In the main competitive period (due to a decrease in speed) the application of this training is avoided for several days before the competition. For specific training indoors we use a kayak or canoe ergometer. The training is the same as in the water. Elite rowers during strength training must have more specific training than general strength training.

Tabela 4. Zastupljenost treninga snage

Klasa	Opšti trening %	Specifični trening %
Početak	70	30
Napredni	40	60
Vrhunski	30	70

ZAKLJUČAK

Sušтина svakog sporta, time i kajak kanu sporta, je postizanje vrhunskog rezultata. Pomjerenje granica sportskog rezultata moguće je samo postizanjem savršenstva tehničke izvedbe i vrhunske sportske forme na najvažnijim takmičenjima. Savremeni trening u kajak kanu sportu je jedan složen proces koji zahtjeva maksimalno angažovanje kako sportiste i trenera, tako i svih onih koji su uključeni u ovaj sport.

Karakteristično za današnji kajak kanu sport je gustoća kvalitete rezultata. Za najveća odličja ravnopravno se bore veslači visoki jedva 170 cm, kao i oni od 200 cm visine. To je rezultat sagledavanja njihovih psihofizičkih sposobnosti, i na osnovu toga individualni pristup njihovom razvijanju i izgradnji tehnike i stila, te postizanju vrhunske forme. Pri tome metode i dinamika opterećenja (obim i intenzitet) predstavljaju osnovnu jedinicu za izradu valovitog i cikličnog programa od polimakrociklusa do mikrociklusa.

Izbor metoda za razvijanje snage u kajak kanu sportu zavisi od adekvatnosti opterećenja za svakog veslača. Adekvatnost opterećenja u treningu snage zavisi od kvaliteta i funkcije mišića svakog veslača, odnosno od njihovih tjelesnih karakteristika i antropometričkih sposobnosti. U praksi se najčešće koriste metode maksimalnih i submaksimalnih naprezanja, metod ponavljanja istog opterećenja, metod mjenjača opterećenja i dinamičke metode.

Napredak rezultata će dalje zavisiti i od uključivanja trenera i vrsnih veslača u proces poboljšanja sportskih rekvizita (čamac, veslo, odjeća i dr.), kao i stvaranje instrumenata za mjerenje treninga i rezultata (pulsometri, brzinometri, GPS i sl). Dugoročno planiranje rezultata mora uključiti sistematski trening podmlatka. Izmjena iskustava i nove metode u treningu podmlatka mogu predstavljati impuls i eksperimentalno polje za ukupan razvoj trenaznog sistema.

Izjava autora

Autori pridonijeli jednako.

Konflikt interesa

Mi izjavljujemo da nemamo konflikt interesa.

Table 4. The amount of strength training

Class	General training %	Specific training %
Beginner	70	30
Advanced	40	60
Elite	30	70

CONCLUSION

The essence of each sport, and thus kayaking and canoeing is the achievement of top results. Moving the limits of the sport results is possible only by achieving perfect performance technique and top sports form at the most important competitions. Modern training in kayaking and canoeing is a complex process which requires the maximal inclusion both of the athlete and the coach, as well as all those who are included in this sport.

What characterizes current kayaking and canoeing is the density of the quality results. For the greatest titles, rowers who are barely 170 cm compete on equal terms, as do those of 200 cm height. That is the result of the overall view of their psycho-physical abilities, and thus the individual approach to their development and the building of their technique and style, and thus the achievement of top form. At the same time the methods and dynamics of load (the extent and intensity) represent the basic unit for the manufacture of the wavy and cyclical program from the polymacrocycle to the microcycle.

The choice of methods for strength developing in kayak canoe sport depends on the adequacy of the load for each rower. The adequacy of the load in strength training depends on the quality and function of muscle of each rowers, in other words by their physical characteristics and motoric skills. In practice, the most commonly used are methods of maximal and submaximal load, method of repeating the same load, method of load changing and dynamic methods.

The improvement in the results will still depend on the inclusion of both the coach and the top rowers in the process of sport prop improvement (the boat, the oar, clothes and so on), as well as the design of instruments for the measuring of training and the results (pulsometers, speedometers, GPS and so on). The long-term planning of results must include the systematic training of younger competitors. Altered experience and new training methods can represent an impulse and experimental field for the overall development of the training system.

Authorship statement

The authors have contributed equally.

Financial disclosure

We declare that we have no conflicts of interest.

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Primljen: 15. decembar 2012. / Received: December 15, 2012
Izmjene primljene: 8. februar 2013. / Revision received: February 8, 2013
Prihvaćen: 12. februar 2013. / Accepted: February 12, 2013