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# *Proceeding*

*International Scientific Seminar on*

**SPORT AND SPORTSCIENCES**

**“The Role And Contribution Of Sport  
And Sportsiences In Enhancing  
A Better Quality Of Life”**



**Kerjasama antara  
Universitas Negeri Padang dan  
Universiti Kebangsaan Malaysia**

Pangeran Beach Hotel  
Padang, 12 – 13 September 2013

# **PROCEEDING**

## **INTERNATIONAL SCIENTIFIC SEMINAR ON SPORT AND SPORTSCIENCES**

### ***The Role and Contribution of Sport and Sportscience in Enchancing A Better Quality of Life***

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## KATA PENGANTAR

Puji syukur kehadirat Allah SWT karena atas perkenan-Nya telah dapat menyusun Prosiding Seminar Internasional dengan tema ***“The Role and Contribution of Sport and Sportscience in Enhancing a Better Quality of Life”***.

Seminar Internasional ini merupakan bagian dari kontribusi Fakultas Ilmu Keolahragaan Universitas Negeri Padang yang bekerjasama dengan Universiti Kebangsaan Malaysia untuk melakukan diseminasi dan mengkomunikasikan serta bertukar fikiran mengenai topik-topik terbaru dari olahraga dan ilmu keolahragaan dan untuk selanjutnya mencari jalan keluar terbaik dari masalah-masalah yang aktual melalui pendekatan inter-disipliner.

Untuk itu, kami menghaturkan terima kasih kepada Universiti Kebangsaan Malaysia (UKM) yang sudah dapat melakukan kerjasama dengan Fakultas Ilmu Keolahragaan Universitas Negeri Padang (UNP), dalam hal ide pelaksanaan kegiatan seminar ini, pemerintah provinsi Sumatera Barat, pemerintah kabupaten/kota se-Sumatera Barat, DPRD provinsi Sumatera Barat, pimpinan Universitas Negeri Padang, pimpinan Universiti Kebangsaan Malaysia, pimpinan Fakultas Ilmu Keolahragaan UNP, Bank Nagari Cabang UNP, para penyaji makalah, dan peserta seminar. Semoga amal baik Bapak/Ibu memperoleh balasan baik yang berlipat ganda dari Allah SWT.

Padang, September 2013  
Dekan FIK UNP,

**Drs. Arsil, M.Pd**  
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## KATA SAMBUTAN KETUA PANITIA PELAKSANA

Walaupun bukan segala-galanya, kebermanfaatan olahraga tidak hanya dapat difahami dan dirasakan secara teoretik semata tetapi harus dapat diaplikasikan ke dalam kehidupan yang nyata. Bagaimanapun juga kajian-kajian secara teoretik masih diperlukan untuk hal-hal yang dapat diterima, secara rasional sehingga olahraga dapat diterima tidak saja secara empirik tetapi juga secara teoretik.

Perkembangan dunia yang begitu sangat pesat, memaksa kita mempersiapkan sumber daya yang memiliki daya saing yang tidak saja secara local tetapi juga harus bersifat universal. Era Globalisasi dan persaingan pasar bebas, telah menjadi ancaman dan sekaligus tantangan untuk bisa bersaing dengan bangsa-bangsa di belahan dunia lainnya. Seluruh aspek kehidupan akan terkena imbasnya tidak terkecuali dalam aspek pendidikan mulai dari tingkat pendidikan paling rendah sampai ke tingkat yang paling tinggi.

Seiring dengan perkembangan dunia saat ini, perkembangan olahraga sangatlah pesat. Perkembangan ini diiringi dengan bermunculan *issue* dan pengetahuan di bidang olahraga. Informasi-informasi yang aktual seputar olahraga bermunculan. Diharapkan forum seminar ini mampu memberikan wadah untuk dapat mengkomunikasikan serta bertukar fikiran mengenai topik-olahraga dan ilmu keolahragaan dan untuk selanjutnya mencari pemecahan masalah.

Perguruan Tinggi khususnya Fakultas Ilmu Keolahragaan Universitas Negeri Padang (FIK UNP), juga ikut bertanggungjawab dan terjun langsung dalam rangka mempersiapkan SDM di atas melalui penyiapan generasi menghadapi *issue-issue* yang muncul dalam dunia olahraga. Sehingga out come yang dihasilkan bisa disejajarkan dan memiliki daya saing yang handal dalam menjawab tantangan era globalisasi dan persaingan pasar bebas.

Untuk tujuan itulah, FIK UNP melakukan perintisan awal melalui kegiatan seminar internasional yang bertemakan “***The Role and Contribution of Sport and Sportscience in Enchancing a Better Quality of Life***”. Tujuan Seminar adalah untuk mengkomunikasikan dan bertukar pengalaman topik-topik terbaru dari olahraga dan ilmu keolahragaan dan mencari jalan keluar terbaik untuk masalah-masalah yang aktual melalui pendekatan interdisipliner .

Seminar ini dilaksanakan pada tanggal 12 dan 13 September 2013. Seminar ini bertempat di Pangeran Beach Hotel Kota Padang Provinsi Sumatera Barat. Sebagai Ketua Pelaksana kegiatan ini, saya ingin menyampaikan penghargaan yang setinggi-tingginya kepada FIK UNP Padang, serta kepada Universiti Kebangsaan Malaysia dan semua anggota panitia yang telah berupaya sekuat tenaga, menyisihkan waktu dan tenaganya dalam rangka mensukseskan acara ini. Terima kasih atas kerjasama dan komitmennya.

Terakhir saya menyampaikan rasa terima kasih yang paling dalam khususnya kepada para pembicara kunci yaitu Dr. Ir. Roy Suryo, Menteri Pemuda dan Olahraga, Prof. Dr. Phil Yanuar Kiram Rektor UNP Padang, Prof. Dr. Hemut Digel Universitas Tübingen, Prof. Dr. Jackueline D. Goodway, OHIO State University USA, Dr. Mohd. Taib Harun, Universiti Kebangsaan Malaysia, Dr. Michael Koh, Republic Polytechnic Singapore, Dr. Norlena Salamuddin, Universiti Kebangsaan Malaysia, Prof. Dr. Joko Pekik Irianto, Deputi Peningkatan Olahraga Prestasi Kemenpora, Dr. Ian Harris Sujae, Republic Polytechnic Singapore, Robert Jhon Ballard Australian Strength and Conditioning Assosiation dan khususnya kepada para pembicara kunci yang datang dari luar negeri, saya berharap semoga selama keberadaan di kota Padang, memperoleh pengalaman yang baik dan menyenangkan dan diiringi doa semoga selamat kembali pulang menuju rumah dan keluarga masing-masing. Semoga hasil seminar ini akan membawa pencerahan bagi kita semua, bagaimana upaya yang harus dilakukan oleh Perguruan Tinggi khususnya FIK UNP Padang dalam membentuk manusia Indonesia yang berdaya saing tidak saja secara local tetapi juga internasional. Semoga amal baik Bapak/Ibu memperoleh balasan baik yang berlipat ganda dari Allah SWT.

Ketua Pelaksana,

**Prof. Dr. Sayuti Syahara, M.S., AIFO**

## KATA PENGANTAR EDITOR

Pertama dan yang paling utama, kami panjatkan puji syukur kehadirat Allah SWT, atas petunjuk dan karunia-Nya, sehingga Prosiding Seminar Internasional Olahraga dan Ilmu Keolahragaan dengan tema ***“The Role and Contribution of Sport and Sport Science in Enchancing a Better Quality of Life”*** yang akan dilaksanakan pada tanggal 12 s/d 13 September 2013 dapat diselesaikan dan diterbitkan.

Seminar tersebut terselenggara berkat kerjasama antara Universitas Negeri Padang dengan Universiti Kebangsaan Malaysia yang mengundang keynote speaker sebanyak 8 (delapan) orang yang berasal dari Jerman, Amerika, Australia, Malaysia, Singapura dan Indonesia serta didukung oleh 62 makalah teknis yang disampaikan dalam sidang paralel. Di dalam prosiding ini berisi 4 makalah keynote speaker dan hasil karya tulis ilmiah lainnya yang berasal dari berbagai institusi yaitu; 1) University of Tübingen, 2) The Ohio State University, 3) Universiti Kebangsaan Malaysia, 4) Universitas Padjadjaran, 5) Universitas Negeri Medan, 6) Universitas Negeri Jakarta, 7) Universitas Negeri Padang, 8) Universitas Negeri Manado, 9) Universitas Pendidikan Indonesia, 10) Universitas Negeri Yogyakarta, 11) Universitas Negeri Semarang, 12) Universitas Cendrawasih, 13) Universitas Pendidikan Ganesha Singaraja, 14) Universitas Bina Darma Palembang, 15) KONI Provinsi Sumatera Barat, 16) KONI DKI, 17) Sekolah Dasar Negeri 7 Keliat Ogan Ilir Palembang.

Prosiding ini telah melalui proses editing oleh dewan editor/penilai karya tulis ilmiah serta dilengkapi dengan diskusi dan tanya jawab pada saat seminar berlangsung. Semoga penerbitan prosiding ini dapat memberi manfaat dan dapat dijadikan acuan dalam pengembangan penelitian yang terkait dengan perkembangan dunia keolahragaan. Kami mengucapkan terima kasih yang sebesar-besarnya kepada semua pihak yang terlibat dalam penyelesaian penyusunan prosiding ini dan mohon maaf atas ketidaksempurnaan dalam penerbitan prosiding ini.

### **Editor**

1. Dr. Norlena Salamuddin
2. Dr. Mohd Taib Harun
3. Prof.Dr.Sayuti Syahara, MS, AIFO
4. Dr. Syahril B, M.Pd
5. Drs. Arsil, M.Pd
6. Drs. Syafrizar, M.Pd

**JADWAL KEGIATAN SEMINAR INTERNATIONAL  
PADANG, 12 - 13 SEPTEMBER 2013**

HARI/ TANGGAL	WAKTU	KEGIATAN	KETERANGAN	PENANGGUNG JAWAB	
<b>HARI KE 1</b>					
Kamis, 12 September 2013	08.00 - 09.00	<b>PENDAFTARAN/REGISTRASI</b>		Seksi Acara	
		<b>PEMBUKAAN/PERESMIAN</b>		Seksi Acara	
		Laporan Ketua Panitia	Prof. Dr. Sayuti Syahara, MS.,AIFO		
		Sambutan	Prof. Dr. Phil. Yanuar Kiram (Rektor UNP)		
		Sambutan	Prof. Dr. Irwan Prayitno, M,Sc (Gubernur Sumbar		
		Sambutan dan Pembukaan Seminar	Dr. Ir. Roy Suryo (Menpora)		
	10.00 - 10.30	<b>ISTIRAHAT/ TEA BREACK</b>			
	10.30 - 12.30	<b>PLENARI I/ PLENO I</b>			Ruri Famelia
		1. Prof. Dr. Helmut Digel	Universitat Tubingan - Germany		
		2. Prof. Dr. Jackie Goodway	OHIO State University - USA		
		3. Prof. Dr. Joko Pekik Irianto, M.Kes.,AIFO	Deputi Peningkatan Olahraga Prestasi Kemenpora - INA		
		4. Dr. Michael Koh	Republic Polytecnic Singapore		
	12.30 - 14.00	<b>ISTIRAHAT/ LUNCH BREAK</b>			

	14.00 - 17.00	<b>PARALLEL SESSION I :</b>			
		RUANG 1.	Physical Education	Bafirman	
		RUANG 2.	Physical Education	Khairuddin	
		RUANG 3.	Psychologi	Wilda Welis	
	RUANG 4.	Psychologi	Umar		
	17.00 - Selesai	<b>ISTIRAHAT/MINUM PETANG</b>			
<b>HARI KE 2</b>					
Jum'at, 13 september 2013	09.00 - 11.30	<b>PARALLEL SESSION II :</b>			
		RUANG 1.	Management	Bafirman	
		RUANG 2.	Physical Education	Khairuddin	
		RUANG 3.	Psychologi & Recreation Sport	Wilda Welis	
	RUANG 4.	Training Theory	Umar		
		12.00 - 14.00	<b>ISTIRAHAT / LUNCH BREAK</b>		
	14.00 - 16.00	<b>PLENARI II/ PELNO II</b>			
		1. Dr. Taib Harun	Universitas Kebangsaan Malaysia	Rina Ambarwati	
		2. Mr. Robert John Ballard	Australian Strenght Conditioning Assoconiation		
		3. Dr. Noerlena Salamuddin	Universitas Kebangsaan Malaysia		
4. Prof. Dr. A. Purba, MS.,AIFO	Universitas Padjajaran				
	16.00 - Selesai	<b>PENUTUPAN</b>			



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## **BASIC CONCEPTS IN PHYSICAL EXERCISE ON SPORT**

**E m r a l**  
**Padang State University**

**Abstract:** Conditioning program in a sports is a training activity in the form of physical as a basis to support the achievement of every exercised sport. Conditioning program is a program implemented during at general and special preparation in order to form the basis of physical, as well as to treat the injury during practice or games. Conditioning program includes strength, endurance, agility, flexibility, and balance. In this conditioning program, a coach are required mastering dominant muscle structure in the branch sport, knowing a type of muscular of all athletes he train, training methods appropriate to the purpose of the exercise, and any appropriate tools for training based on exercise goals. Demanding conditioning program needs coaches should understand the biochemical and microscopic changes due to conditioning program as well as the energy system that occurred at the time of the conditioning program is done, and the general principles in the conditioning program with the intention that in the process of training, the athlete can develop in accordance with the assigned objectives, the achievement can be met, but the important thing is that a fatal injury don't occur during the exercise process.

### **Introduction**

Athletes participating in a good exercise and based on sport science and conditioning program in sport should be able to get the four following advantages:

- a. improving sports performance
- b. reducing the risk of injury
- c. strongly reducing the incidence of injury
- d. accelerate healing and restore activity after injury

Currently there is no legal certainty that the increasing of various components of conditioning or fitness offers athletes in reducing the risk of injury, despite being advised by many opinion theoretically beneficial for the prevention of pre- participation of sport conditioning progra. To prevent injury from the smallest level and return, the athletes must balance their normal activities with exercise.

To increase the size and strength of the muscles which will then generate the linkage scope of the injury, these are people who have ideas that affect the physical conditioning program:

1. Rasch argues that athletes in a state of exhaustion is less efficient and low reaction although to cope with situations may result in injury .
2. Thorndike argued that exercises for strengthening ankle and knee can reduce injuries in the area .
3. Adam argued that practicing habits can lead to a significant increase in strengthening the ligaments around the knee and to prevent injury to the knee .
4. Falls et al argued that move skills development is important in preventing injury .
5. Kraus argues that in addition to conditioning in general is a major factor in the prevention of injuries athletes. It is also important in the prevention of pre-injury .
6. Cahilil and Griffith argued that a pre-season of physical conditioning programs generally produce fewer knee injuries .

### **Conditioning Program Discussion**

Physical conditioning or sport can be classified in various ways . Table 2.1 shows the component of physical conditioning program. Specifically, their interpretation and applications for injury prevention component. Injury, similarly a prevention, influenced by the original position and layout of the muscles . the connection with joint and drag angle of muscle on bone at certain time through the range of movement, for example, if an muscle originally adjacent to the joint and the it feeder at a distance range of liaison. The main action of the movement will keep the two bones connected by a joint an exact estimate The movement of these muscles wiil produce stability in the joint (the action of muscle movement) . An example of the action stabilazation at the joint is Glenohumeral joint which is composed of the head of humerous articulation with the glenoid Fusa at surface of the scapul. Free and flexible joint capsule, this result of a wide range of movement, and supporting moer weak ligament. The muscles around the shoulder requires development and conditioning in order to increase stability optimally by the shoulder . When a main muscles produce movements of joints, the right conditioning could allow the muscles to prevent a excessive movement . Connector muscles are often at risk due to the emergence of the power (eg; tekling or blocking in football) . All components of conditioning has reciprocal relationship adjusted with each sports conditioning and its role to prevent injury, see the table below:

Table 2.1 Conditioning Components in Sports

Conditioning componen	definition	Implementation on injure prevention
Power	The maximum force a muscle removed from the business Force x distance x time x speed or strength	To stabilize the area of the body against the force used To shorten the time used to increase the energy used (type of spontaneous movement) for example; possibility direct response to reduce injuries
Muscle endurance spasticity agility	Ability to reduce the amount of muscle contraction The range of movement allowed by connecting tissues surrounding The role of coordination and speed controls allow fast changes in movement or body orders	Capacity low muscle endurance potentially increase injury To respond to outside forces without harming network participating To merubahat direction and position of the body quickly, with precision efisiendan role in the response to prevent injury
balance The main response (distinction kinesthetic) Cardiovascular respiratory endurance	Body balance by supporting basic Awareness of body position in space Appropriate function or response to physiological systems that send fuel and oxygen to the active muscles	To control and maintain the state of the body is static or dynamic in order to prevent undesirable position that produces injury To sense the position of the various parts of the body or of prudence over the space corresponding to prevent injury (as an example: the position of the foot as a start in dealing with the floor or ground after the jump) To facilitate continuity of effort expended in order to avoid exhaustion attacks that may provide the possibility of injury.



( ADP). Low pressure Veins is also low in triphosphatasenya adenosine, similarly the enzymes used in the reduction of glycogen to lactate.

And requires a considerable period of time to generate randomly at a low power level. Type I veins particularly raised oxidation and aerobic metabolism (eg, the ability to use oxygen in a fairly long period in order to unify and use ATP ) . They have a lot of mitochondrial enzymes that can burn carbohydrates and fat which are given by a large number kapillari per vein than fast pulsing veins . Weak pulsating veins are more resistant to fatigue and was first taken during the sub- maximal exercise . However if the practice continued until exhausted all vein types used are deployed . If the branches are not removed , type I seem to rapidly become atrophied and not protected by the isometric contraction

b ) fast twitch fiber

veins Type II used to develop activities and produce more power at a period of time (half the time of vein type II ) . as a whole veins twitching rapidly have a lot of high level on adenosine glikotisit triphopastase and enzyme activity (an enzyme that helps break the glycogen but does not require oxygen ) of the veins twitching weak that there are three veins which are current rapid twitching described - type Ila , Ilab , and Iib . They are fundamentally different in its durability . Vein type Ila has a certain durability depends on the speed and power, but not like most endurance on the type I. Veins are veins on the type Iib fast type that powered the kelelelahannya faster than the others ( they have a little mitikondria ) . They are pure glikolisit , which means that they can function without oxygen , but only for a very short time . Type Ilab lies between type Ila and Iib in power and endurance. Therefore , in practice , the type Iib could take some type Ila features . If the limbs are not moved , isometric contraction would prevent type II development.

Table 2.3 Characteristics of Muscle structur

<i>Type of vein</i>	<i>Speed contraction</i>	<i>endurance</i>	<i>Oksidatif or glycolytic</i>	<i>Burning fat and glycogen earobik</i>
I	slow	yes	oksidatif	yes
lia	Fast	yes	oksidatif	yes
liab	fast	middle	oksidatif & glycolytic	possible
lib	fast	no	glycolytic	no

\* Oxidative : the ability to use oxygen to extend the time for the collection and use of ATP

\* Glycolytic : the ability to not use oxygen, even if only for a moment

c) Biochemical and Microscopic Changes that may occur in Conditioning Exercise

Training for endurance will lead to the concentration of mitochondria in oxidative enzyme levels in muscle cells. Exercises to run with high intensity causes only a slight change, but increase glycolytic enzyme system. Endurance training is given in order to increase the amount of glycogen being doubled. And again, this adaptation appears possible it is to conserve glycogen by fat burning to produce energy. Oxidative enzyme levels may be three or even five times greater in muscles that are not well-trained athletes compared to trained athletes . It was also indicated by the fast twitch muscles to improve and increase the oxidative capacity as a result of resistance training . endurance training can result in an increase in the number of capillaries per muscle fiber, but it seems a little effect or no effect on the development of muscle size, which is usually with heavy endurance exercise will causes an increase in the size of muscle fibers and also strength, but no increase oxidative in muscle .

## 2 . General Principles Of Conditioning

There are some general principles that apply to the development of conditioning components . The principles are:

- a. Load More (Overload) . To facilitate improvement, the system used should be gradually increased load or given additional burden depend on which components will be increased, then the administration should implement more load on the development of :
- 1) . resistance
  - 2) . Reps or sets
  - 3) . intensity exercise
  - 4) . duration of exercise

- b . specificity. The effects of the conditioning program has specificity based on load applied and a particular system of the body that was given weight training .

The Principles can be summed up in a single principle called SAID ( Specific Adaptation to Demands ). SAID principle states that if a body is subjected to load with varying intensity and duration, then the body will try to overcome the burden of the adjustment is specifically based on the demands imposed. It should be noted that although giving more weight or demands placed on the body so that the body develops, manages, but the burden should not be giving too much so that it can prevent the body from its inability to adapt .

**a. Strength**

one muscle fiber consist of a myofibril bibs . Each myofibril is also made up of thousands of sarcomeres. When sarcomeres receiving stimulation of the nervous system, a chemical reaction will occur where the available energy resulting from the formation of ATP . Sarcomeres contraction results in a " launch " on myocin actin . For muscle development or hypertrophy of the muscle should be given weight . When the loading was done repeatedly with high intensity, then the muscles will increase in size and strength . The increase appears to result from an increase in the strength program is influenced by the level of power held by the individual in accordance with a set of programs and also the method and intensity. Strength program can be classified force at legs and arms ( table 2.4 ) .

Table 2.4 Resistance Types Used in General

Resistance types	Move types	Used tools
Isometrik	Muscle contraction, no move	Object/tool unmoved
isotonik	Resistensi tertentu, dgn kecepatan dan gerakan yang berubah-ubah certain resistance, with speed and move which change.	No load
concentric eccentric	Contraction of the muscle shortened Contraction of the muscle shortened Contraction of the stretched muscle	Pulley on the wall Weight toll which could be controlled (calisthenics in general, nautilus, )
Isokinetik	Kecepatan tertentu, resistensi yang akomodatif	Cybex, orthotron

- a. The type of resistance used
  - b. amount of load resistance used
  - c. the number of reps per set
  - d. number of sets per exercise unit
  - e. number of training sessions per week
- Power level can be determined by using the following measurement tools:
- a. tensiometer cable
  - b. dynamometer
  - c. dinamometer cybex isokinetic

However, measuring instruments are used mainly in the field at the level / rate of early strength is once repetition maximum, which seem to be enough to meet the measurement objectives. When trying to increase strength, it is appropriate to hold a workout with maximum resistance to get maximum results as well. Berger results showed that those who practiced with 4,6, and 8 reps per set produce greater improvement than those who train with 2,10, and 12 reps per set.

Delome develop this system is based on 10 times repetition maximum (10 RM).

Set	Resistensi	Repetition
First	50 % dari 10 RM	10 x
second	75 % dari 10 RM	10 x
thirth	100 % dari 10 RM	10 x

Program to improve the strength in particular should be given individually and determined based on the needs of athletes . Coaches must know the correct technique of lifting / loading with lifting means used in the training exercise program.

- a. Seated Military Press: Starting position sitting, the beams are at the front of the chest . Grip: pronated, with hands slightly wider than the shoulders . Technique: Sit upright, chest dibusungkan, beam lift up until your arms are extended straight up, hold the beam in order to remain close to the body, the head remains upright, lower the beam at the starting position. Breath: breathe during lifting beams and release the breath while lowering the beam movement. Main muscles used : trapezius, anterior, anterior deltoid, pectoralis, triceps.
- b. Press Behind Neck: Starting position: beam on the back head slightly touching the back of the neck. Grip: pronated, with hands slightly wider than the shoulders. Technique: lifting beam to elongate arm straight up. Breath: breathe during lifting beam and release the breath while lowering the beam movement . Main muscles used: upper trapezius, middle and anterior deltoids, triceps .
- c. Squat: Starting position: put a beam across the shoulder, erect beam with the help of the head. Grip : pronated, with hands slightly wider than both shoulder. Technique: do squats with control until thighs parallel to the floor . Main muscles used : erector spinae , quadriceps , gluteus , maximus , hamstrings .
- d. Bench Press ( left ): Starting position: accept beam from the coach at the time of the supine position, the head is placed on the bench, back straight, and feet touching the floor . Grip: pronated, with arms wide over the width of the shoulders.



Technique : beam down to almost touching the chest and lift the beam up to the elbows locked or straight position . Main muscles used: anterior deltoid, pectoralis major , latissimus dorsi , triceps .

**b . Power**

Additional contribution to protection against injury is the muscle's ability to contract or use force ( force ) at an accelerated pace ( power is defined as the result of a combination of power ( force ) and velocity ( speed ) ) . used isokinetic equipment show in the development of power .

**c .Muscular Endurance**

In addition to muscle strength and muscle power, muscle endurance also plays an important role in preventing injuries. An athlete does not just need to get the right level of power but also can, maintain a high percentage of the force over time or over a series of muscular effort was to repeat the activity.

In general, the principle is applied to the development of power as it applies to the development of muscular endurance. Therefore, the method can be used on a strength training workout muscle endurance with some modifications as follows:

- 1 . reduce the amount of resistance
- 2 . increase the speed workout
- 3 . increase the number of reps and sets if possible

**d . Flexibility**

Muscle quality system is also important is flexibility . It has been discussed earlier that the lack of flexibility will cause muscle injury .

Adequate flexibility for athletes consist of least two aspects , namely :

1. full movement distance, it is important for athletes in the form skills
- 2 normal rest and excursion distance of expansion / muscle tendon lenght unit allow businesses protection against injury .

**e . Cardiovascular -Respiratory Endurance (aerobic)**

Athlete's ability to sustain muscular effort in berkonstraksi require cardiovascular system (heart endurance) and respiratory (breathing) is sufficient . This system should be developed so that it can produce , distribute , and use oxygen , and therefore extend the time in order not to feel tired fast . Fatigue can prevent athletes from injury through effective use of the muscular system or the system response to injury from possible injury situation . There are several laboratory tests that are useful to assess cardiopulmonary fitness level ( related to the heart and lungs ) .

- a. step - up test . This test standard menggubakan pulse on every load exercise as an indication of fitness . Healing ability is also determined by measuring the time it takes for the pulse to

return to the beginning of the percentage of time the average resting pulse rate .\

- b. . treadmill test ( a kind of tool that is run with trampoline ) and bicycle ergometer (bicycle) . This test is used to measure the oxygen used during exercise (VO<sub>2</sub>max) .

In addition to laboratory tests there are also field tests , which is adapted to the characteristics of the sport . " Tests were carried out in the field " is more practical to coach in the Cardiovascular - Respiratory assessment on a number of athletes . Results of the tests run 12 minutes a la Cooper or 1 and 1.5 mile run can be compared to establish a norm , but it would be more beneficial if the individual that forms the basis of distance or time alone . Increased Cardiovascular - Respiratory must be specifically tailored to the needs of athletes . The following things need to be considered in improving the Cardiovascular - Respiratory :

- 1 . intensity exercise
- 2 . duration of exercise
- 3 . frequency of exercise

Exercise intensity can be determined from the pulse response , with the assumption that the athlete had been previously protected from doing endurance program . \* With the use of the pulse as the effects of the activity athletes , so we can determine the level of intensity. Example , age -related maximum pulse , ie usually to the age of 20-30 years of 190 per minute . If it is determined that athletes should perform exercises 80 % maximum heart rate, then " exercise pulse " is right for the athletes to 152 per minute , with at least 10-15 minutes of exercise . The measurement is the average pulse rate for exercise endurance program . However , the duration of time to be determined by looking at the level of conditioning . One session with a time of at least 30 minutes , while maintaining a pulse on the target average pulse , it should produce a good endurance conditioning . Frequency of exercise that will produce minimal effects on endurance athletes are 2 sessions per week of aerobic activity , where most of the Athlete have to do at least 4 times or 4 sessions per week .

#### **f . Anaerobic conditioning**

In addition to aerobic fitness can prevent fatigue , also needed for the body's anaerobic system . Increased anaerobic conditioning depends on the type of activities undertaken athletes . For example , the movement is very fast with a short duration of time to make this type of conditioning is used to build up reserves of the combined energy of the collection system and to re- train combinations reserves at a faster pulse . However, the anaerobic system also needs to be improved by using a rather long time activity by athletes , for example, with interval training

The discussion above seems to only talk about the conditioning program prior to practice time . However , for the purpose of injury prevention should also memeperhatikan complete the following :

- 1 ) . Conditioning program in / during exercise . Some athletes think that just by participating in sporting activities that can result in high levels of physical conditioning , and they do not realize that without a special training program , some components of physical fitness can decrease during exercise .
- b . Conditioning program after the workout . At this phase of the program should identify and emphasize rehabilitation dist special , and should help to retain for athletes to remain at the level appropriate / sufficient according to the components of the body called the kabugaran physical / bodily .

## **B. Conclusion**

Conditioning program is an exercise program to prevent injuries before continuing the exercise program toward achievement . Conditioning program shall be done in accordance with the principles set out in the exercise so that the purpose of conditioning exercises that can be achieved optimally . As a lady trainer must understand the system in training speed , strength, endurance, flexibility, balance and also master the proper training methods, equipment used and the muscles of the dominant branch he trained so that injuries can be avoided .

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