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Chair of physical rehabilitation, sport medicine and valeologies

«Is confirmed»
At methodical meeting of physical rehabilitation, sports medicine and valeology chair
_____
(the chair name)

The head of the chair
_____ Nekhanevich O. B.
«___»_____ 20 p.

METHODICAL INSTRUCTIONS

TO STUDENTS OF __IV__ course __medical__ faculty

FOR INDEPENDENT WORK

BY PREPARATION FOR THE PRACTICAL TRAINING

MODULE № 1: PHYSICAL REHABILITATION, SPORT MEDICINE

Thematic module 1: Sport medicine

Theme № 4: Medical and pedagogical control while physical training .

Dnipropetrovsk - 2013

MODULE I. PHYSICAL REHABILITATION, SPORT MEDICINE

Thematic module 1: Sport medicine

Theme № 4: ***Medical and pedagogical control while physical training.***

1. **Theme urgency:**

   Medical and pedagogical control while trainings and competitions is the important aim of sport medicine. It gives a chance to evaluate the influence of physical exertion on an athlet while training. It makes possible to estimate the functional state of an organism, to mark the overtraining or physical exhaustion because of non-adequately organized training process.

2. **Theme duration:** 4 hours.

3. .**The educational aim:** to find out how to provide the medical and pedagogical control while competitive and training process.

   Concrete aims:

   To know:
   - The theoretical basement of medical-pedagogical control its aims;
   - Forms and methods of medical-pedagogical control;
   - The special points of organization, accuracy and safeness while physical training;
   - Urgent, delayed and cumulative training efects;
   - The levels of 'acute changes' while training;
   - Signs of overtraining

   To be able:
   - To estimate the training place condition;
   - To estimate the adequacy of physical exertion;
   - To evaluate different levels of overtraining;
   - To marc the premature sign of athlet`s overfatigue because of non-adequate exertion;
   - To evaluate the levels of 'acute changes' while training;
   - Evaluate general and motor density of the training;
   - To diagram «the physiological curve» of the training according to the main physiological parameters;
   - To analyze the data and to make a conclusion to the examination;
   - Give recommendations about improvement of the training process.

   To develop practical skills:
   - Self examination of accommodation`s condition, where the training is practiced;
   - Self examination of the functional state of an athlet (20 squats in 30 s., cardio-pulmonological test.);
   - The chronics of the training and estimation of its general load;
   - Taking main physiological parameters (HR, BP, BR) after several parts of the training to diagram «the physiological curve» of the training;
   - To work with special medical documents and data.

4. **Basic knowledge, skills (interdisciplinary integration) –** (table 4.1):

Table 4.1

The names of previous disciplines	Practical skills
Normal physiology	To be able to registrate main physiologic features, to know the loading test methodic.
Pathologic physiology	To define the development process of prepathologic and pathologic organic changes, non-adequate physical exertion impact
Propedeutics of internal disease	To take blood pressure, heart rate, describe pulsus. To be able to take electrocardiography, to hold the loading test. To evaluate the

	medical data.
Pediatric Propedeutics	To know the specifics of physical development in children according to different age.

5. Students advice.

№	term	Determination
1.	**Medical and pedagogical control**	The supervision, which is held by the physician and the coach while training
2.	**Training load**	Time of physical exertion to general training time
3.	**«Physiological curve» of the training**	the diagram based on the main physiological parameters on different parts of the training

5.1 Theoretic questions:

1. General characteristic the physical exertion by different intensity on man influence (Hypo-, optimal, hypodynamia).
2. The changes in cardiovascular, respiratory, digestive, immune and endocrine systems after optimal physical exertions.

5.2 Practical part:

1. To diagnose and treat of early symptoms the overfatigue, acute and chronic overexertion, others diseases and sports injuries, which arise at irrational occupation of physical culture and sports
2. An estimation of conditions, organisation both realisation of trainings and competitions.
3. Definition of influence of trainings and competitions on body of the persons, which are engaged in sports or physical culture

5.4. Theme content:

Medical and pedagogical control is **t**he supervision, which is held by the physitian and the coach while training

The main aim of MPC is evaluation of different factors` influence on the one, who does physical training; the improvement of training process.

Medical and pedagogical control while trainings and competitions is the important aim of sport medicine. It gives a chance to evaluate the influence of physical exertion on an athlet while training. It makes possible to estimate the functional state of an organism, to mark the overtraining or physical exhaustion because of non-adequately organized training process; to prevent the appearance of pathological and prepatological symptoms.

Preparticipation exams afford the examiner an opportunity to counsel athletes on health-related issues, including vaccinations and drug and alcohol use. The examiner can teach injury prevention and explain health risks inherent to the sport. Preparticipation exams are also an important opportunity to warn athletes about the dangers of steroid use and to detect illegal performance-enhancing substances. Examiners screen for signs and symptoms of pathological states that may lead to a traumatic or nontraumatic injury or death while participating in sports. Specifically, they consider the musculoskeletal system and the heart.

Medical and pedagogical observation

There are simple complex and instrumental methods

- ***simple:***	***Instrumental***:	***Complex***
General anamnesis visual supervision	ECG myotonometry, oxygenometry chronaximetria	Telemetric and radiotelemetric heart rate registration and breath rate registrationi
HR estimation		
BR estimation		
BP taking		Blood and urine biochemistry
VLC		
Power of breathing muscles		Muscle biopsia.
Weight		
Dynamometry		
Clinical ortostatic test		

Despite this the methods are grope and individual.

Training and competition conditions

First of all, the medical control should check the hygienic conditions of the training/competition accommodation. The physitian checks the training equipment, asks about safety equipment, talks to the coach about the structure of trainings.

As a conclusion he creates the document, describing the accommodation. It should contain^

1. the basement.
2. Equipment of sport objects.
3. The condition of sport equipment.
4. the realization of medical control on the base.
6. formulate conclusions.

Then he proclaims whether it is possible to hold the training or competition on the base., describes the general state of the accommodation, gives recommendations and remarks, gives advises about the improvement

Then he evaluates the training process by filling in the protocol of physical training. (**addition 1**)

To estimate whether the training held correctly it ids built the physiological curve, which represents the training load. **(additions 2 and 3)**.

Training load is the time of physical exertion to general training time.

It can be done by the chronometric data assembling. It separates into 4 parts: ***introductary,*** , ***preparatory, basic*** and ***conclusive***. Using a stopwatch the duration of the exercise, rest and explanation is calculated. The training load separates into general(pedagogically correctly spent time) and motor (physical exertion time to general training time)

Physical curve is another way to analyze the medical pedagogical control data. It visually represents the level of physical load of the systems in different parts of training. It allows to evaluate the order and allocation of physical exercises.

Frequently it is a broken line slowly increasing. This represents normal chronometry of the lesson.

The effect of physical exercises is

Urgent – develops while practicing exercises.

Delayed – develops on the final stages of restore.

Cummulative – is the sum of numerous training effects.

Symptoms of fatigue.

Low level redness of face, the speaking skills are adequate, calm ordinary mimics, sweatness, BR increased, symetric, active movement.

Average level increasing redness of skin, speaking complications, taut face, sweating oh upper part of the body, highly increased BR, uncertain walk, swinging, exhaustion, muscle pain, heartbeat.

High level severe redness, paleness or even cyanosis of skin, speaking complications to dis ability, suffering face, hard sweatness with salt excretion, high BR, hypopnoe, with several deep breathes, changes into chaotic breathing, walk with severe swinging, trembling, a person looks for support or falls down, feels vertigo, pain under right costs, head ace, naussy.

The other method of training effects research is the method of ***«acute changes».*** It describes the changes of athlete`s health after trainings or competitions. The parameters of cardiovascular system, respiratory system, neuromuscular and senses are registered and analyzed before and after training. It is common to use the simplyest parameters that can be quickly and exactly determined. They are HR, BP, VLC, left and right hand dynamometry. They are taken on the 1, 3, 5, 10 and 15 min of the training.

«*acute changes*» are ***medium:***

HR increases to 160-180/min
Sys BP – to 180
Dia BP – constant
VLC decreases 100-200 ml
Dynamometric parameters increase 2-3 kg
Restore is complete in 3-5 min and slowens

«*acute changes*» are ***low:***

HR increases to 110/min max
Sys BP – to 130
Dia BP – 90
VLC decreases mere than100 ml
Dynamometric parameters increase 1 kg
Restore is complete 1 min.

«*acute changes*» are ***huge:***

HR increases to 180-200/min
Sys BP – constant
Dia BP – constant
VLC decreases 300-500 ml
Dynamometric parameters increase 2-6 kg
Restore is complete in 20 min and slowens

The seri of acute changes examinations represent the delayed and cumulative effect from training.

The special performance estimation

The repeating load method means the athlete repeats the same exercise several times. The intensity should be maximal to the factial level of an athlet.

This method is necessary to be used in sports where every exercise is the finished action.

They are discus, javelin, hammer throwing, athletics, all kinds of jumping. Game sports cant be examined in such way because they don`t contain stereotype moving actions.

To estimate the performance several sport-technical results are registered:

1. Run velocity
2. The distance of the throw
3. The technical point of exercises.

The well functional state and special performance is characterized by normotonic reaction of HR and BP combined with high sport-technical parameters. The hypotonic reaction combined with high sport results means the appearance of the hidden fatigue. In this case it is necessary to lower the level of the load while training, cause it may invoke overstrain. Without correction sport technical parameters may significantly decrease.

The additional load method means the athlete does strictly dosed in time and power physical work before and after training or competitions. The functional state is estimated before and after load. In this test HR and BP are estimated. Their changes after additional load describe the changes happened while training.

The additional load can be specific and non-specific. Specific load – thee ones are done one time. Non-specific additional load is any functional test(20 squats, 15-second run on place in max velocity, stepergometry). The additional load should be done after 5 min rest.

***The types of reaction*:**

I type is determined when there are no significant changes in main physiological parameters. It means that the athlet is well trained or the training/ competitive load is too low.

II type the hypotonical reaction in BP and HR is registered. This means the athlet is non-adequately trained or the load is too intensive.

III type hypotonical, hypertonical, diastolic reaction. It means the athlete is extremely bad trained, his functional state is unpleasant.

The other variant of additional load is ***trend-analyze*** (Karu T.E.).
Method is

1. Before training athlete does 30 steps ove the 30sm high step in 1min or 15 sec of max velocity run.
2. The heart rate is taken 10-sec before load (PS_0), start of the 1st minï (PS_1) and 3d minï (PS_3) of restore. The max sys BP is registered before (ATs_0) and after the load. In 15 min after training everything is repeated.
3. The trend of pulse is calculated (1):

$$T_{PS0} = \frac{PS_0 + PS_1 + PS_3}{3} \quad (1)$$

4. The trend of max sys BP is calculated (2):

$$T_{ATs0} = \frac{ATs_0 + ATs_1 + ATs_3}{3} \quad (2)$$

5. The index of trends ($ИТ_0$) is calculated (3):

$$ИТ_0 = \frac{T_{ATs0}}{T_{PS0}} \quad (3)$$

6. After the training this calculation repeates (T_{PS1}, T_{ATs1} and $ИТ_1$).
7. Наприкінці визначається величина впливу навантаження (ВВН) на організм за формулою (4):

$$ВВН = ИТ_1 - ИТ_0 \quad (4)$$

Then the level of the load is evaluated according to the scale (табл. 5.1).

Table 5.1

the level of the load

ВВН	**level**
0 – 0,5	insignificant
0,5 – 1,0	low
1,1 – 2,0	medium
2,1 – 3,0	high
> 3,0	severe

Trend-analyze is necessary to use for sports with cyclic load and the ones improving endurance.

More accurate and progressive method of performance estimation is ECG while training and competitions, radiotelemetric ECG and Holter-monitoring. Vestibulometry, biochemical analyze of blood and other biological tissues are as well used.

This way, several methods give a chance to estimate and evaluate the personal performance of an athlete, that is the biological description of productivity of trainings.

5.3 Self-control materials:

1) self-control questiones:

- The theoretical basement of medical-pedagogical control its aims;
- Forms and methods of medical-pedagogical control;
- The special points of organization, accuracy and safeness while physical training;
- Urgent, delayed and cumulative training efects;
- The levels of 'acute changes' while training;
- Signs of overtraining.
- General characteristic the physical exertion by different intensity on man influence (Hypo-, optimal, hypodynamia).
- The changes in cardiovascular, respiratory, digestive, immune and endocrine systems after optimal physical exertions.

2) Tests:

1) Hepatic pain syndrome in sportsmen is:
A. A physiological condition,
B. *A pathological condition,
C. Occurs only in sportsmen who had suffered from viral hepatitis,
D. Occurs only in teenage sportsmen,
E. Occurs only in sportsmen who infringe dietary habits.

2) Acute physical overstrain refers to all of the following conditions except one:
A. Violation of myocardial repolarization,
B. Spasm of brain vessels,
C. Myoglobinuria,
D. Orthostatic collapse,
E. *Disseminated intravascular coagulation syndrome.

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Discussed on cathedral meeting «____»_____20___p. (Protocol № ____)

The head of the cathedra, Phd. _____ O.B.Nekhanevich

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