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6. Concurrent Training

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6.1 Introduction:

The two types of trainings are given in single training session, either in series or parallel is known as concurrent training. The past three decades the research on concurrent training done by various researchers, the strength and endurance trainings are the two trainings are predominant. These are completely two different trainings. The strength training requires more intensity as well as less repetitions, but endurance training requires more repetition as well as less intensity. In strength training one repetition maximum (1RM) used as tool for finding intensity, the endurance training maximal heart rate method is used as tool for finding intensity for an individual.

In 1RM method the maximal intensity exerted in single repetition and to attain maximal heart rate the more repetitions are needed. So, the repetitions are less in strength training and repetitions are more in endurance training for finding of basic intensity of an individual.

For beginners the 50 to 65% of intensities may exert in 1RM as well as maximal heart rate method, this can be treated as the intensity of before training for the subject. Through strength training the individuals strength, power, stamina especially the resistance increases through endurance training the individual gains his endurance, withstanding power i.e., ability of coping with training for longer period and clear performance of athlete in his skills and techniques. The strength is an ability to act against resistance and the endurance is an ability to act against resistance under the conditions of fatigue.

While combining these two different trainings, many recent research shows that the concurrent training is suitable for lesser training periods i.e., up to 12 weeks of training periods, the micro cycle is suitable one. The results of having minimum training periods of research show significant results.

Since the concurrent training should have minimized training periods. The meso and macro cycles may be suitable for Asian and Olympics training schedules. Doctors suggest the concurrent training for the loss of strength in joints as well as lower and upper limbs, in major muscle groups, the strength may lose by inactive of muscle groups.

The muscle group regains strength through concurrent strength and endurance training. In olden days they suggest strength training only but nowadays they suggest the concurrent strength and endurance training because of recent concurrent training research.

The international and national level players are suggested to do concurrent training during their offseason because to regain their strength level. The strength and endurance parameters are improved significantly after concurrent strength and endurance training as well as endurance parameters.

Usually, strength parameters more significant after strength training as well as endurance parameters more significant after endurance parameters but both of them more significant after the concurrent strength and endurance training. In olden days the track and field events and games ware very lesser in numbers but today we have lot of games are waiting for approval for Olympics and inventions in sports training methods also developed enormously.

The strength training alone practiced for strength and endurance sports in olden days but today many of recent sports available for example: cycling and rowing are needed some leg strength for cycling and shoulder, arm and hip strength for rowing

respectively but these two activities are endurance activities. So, participants needed leg strength, shoulder, arm and hip strength also, by the way coaches prefer the strength training apart from their regular endurance training. Swimming is also an endurance activity but swimmers need leg and arm strength so the concurrent strength and endurance training prescribed by coaches.

6.2 Strength and Endurance Adaption:

Tanaka and Swensen[1] et. al., 1998 found in their research that strength and endurance training regimes represent and induce distinctly responses when performed individually than strength and endurance trainings are performed separately. Strength-training programs involve large muscle group activation of high-resistance, low-repetition to increase the force output ability of skeletal muscle.

In contrast, endurance training programs utilize low-resistance, high- repetition exercises such as running, cycling to increase maximum O_2 uptake (VO2max). Accordingly, the adaptive responses in skeletal muscle to strength and endurance training are different and sometimes opposite.

Strength training has been reported to cause muscle fiber hypertrophy (increase in size of muscle fiber), associated with an increase in contractile protein, which contributes to an increase in maximal contractile force.

Strength training also reduces mitochondrial density and suppresses oxidative enzymes activity which can cause impede endurance capacity but has minimal impact on capillary density (number of capillaries per fiber square millimeter) or in the conversion of muscle fiber types from fast twitch (type II fibers) to slow twitch (type I fibers). In contrast, endurance training usually causes little or no muscle hypertrophy, but it does induce increases in mitochondria content, citric acid enzymes, oxidative capacity and the possibility of muscle fiber conversion from fast twitch to slow twitch.

They suggested that runners and cyclists may improve endurance performance via a resistive weight training program, due to increases in the size of type I fibers, changes in type II subtype ratios, and myofibril contractile properties. These changes may allow individuals to exercise longer at a given submaximal work rate by reducing the force contributions from each active myofibril or by using fewer myofibers.

So, the myofiber changes may also allow an athlete to delay the endurance capacity benefited only from an "in-water" resistance program specific to their swimming stroke, relative to a standard weights program usually given to these athletes. The "in-water" resistance program incorporates the use of biokinetic swim benches and reverse current hydro channel swimming. This may imply that resistance training for swimming needs to be specific to their stroke to achieve any improvements in endurance performance.

Sale[2] et. al., 1990 found that interaction between concurrent strength and endurance training. When presumably stronger stimulus for an adaptation was added to a weaker one, some additive effects occurred (i.e., increases in 1RM and thigh girth that were greater in endurance and strength training than endurance training; increases in citrate syntheses activity and repetitions with 80% 1RM that were greater in strength and endurance training than strength training.

When a weaker, although effective, stimulus was added to a stronger one, addition generally did not occur. Concurrent strength and endurance training did not interfere with strength or endurance development in comparison to strength or endurance training alone.

Bishop and Jenkins[3] et. al., 1999 analyzed that many adaptations are specific to the type of training, some changes that occur with resistance training could influence endurance performance, which include: muscle fiber transformations and muscle fiber (type I) hypertrophy, which may alter fiber recruitment patterns and help

prevent muscle fatigue, as less motor units need to be activated for the same workload. They found that strength training did not reduce endurance performance and may actually improve endurance capacity in long term for endurance performance in 21 female subjects over a 12-week program of strength training. Nelson[4] et. al., 1990 found that many competitive endurance athletes incorporate resistance training into their training in a hope to improve endurance performance. However, as previously mentioned adaptations to exercise are generally considered to be specific to the training type of stimulus.

6.3 References:

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