STRENGTH TRAINING
EXERCISE PRESCRIPTION

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DEFINITION OF STRENGTH

Strength is the ability of the neuromuscular system to produce force.
**EXERCISE PRESCRIPTION**

- Prescription of appropriate exercise stress is important for optimal physiological adaptation.
- Development of an appropriate strength training programme is a complicated process.
- This needs a solid understanding of scientific principles and programme design guidelines.
- Knowledge of scientific principles help in developing logical and successive plans.
- Should be based on sound rationale.
PROPER EXERCISE PRESCRIPTION IS POSSIBLE ONLY WITH:

- Understanding Of Strength Training
- Different Training Variables
- The Training Goals
- The Individual’s Needs
- Training Response
- Pre-training Status
- Sports Demands
MAIN PROGRAM DESIGN COMPONENTS

Needs Analysis
Acute Programme Variables
Chronic Programme Manipulations
Administrative Concerns
NEEDS ANALYSIS

- Is the starting point of any programme design
- To determine the needs of the individual and sport (establish the primary goal or outcome of training)
- Fitness level & training status of the individual.
NEEDS ANALYSIS: GENERAL FOCUS

- Training goal/Sports demand
- Individual’s need (assessment of the Athlete)
- TRAINING GOAL
  - Establish the primary goal or outcome of the training (improvement of strength, Power, size, muscular endurance etc)
- EVALUATION OF SPORT
  - Unique characteristics of the sports helps to design specific training programme
  - Movement Analysis (muscular involvement, body and limb movement pattern, Type of muscular contraction, Speed of contraction).
  - Sports demand strength/ power, hypertrophy, Muscular endurance)
  - Physiological Analysis (Sports Metabolism)
  - Injury Analysis (Common injuries associated with sports)
  - Needs analysis, is essential for the selection of exercises, deciding the intensity
NEEDS ANALYSIS: GENERAL FOCUS cont.

- Assessment of the Athlete (Individual assessment)
- Athlete's needs and goals
- Individual’s current fitness level
- Training background
- Exercise technique experience
- History of injury
ACUTE PROGRAMME VARIABLES

- Choice of Exercise
- Order of Exercise
- Intensity of Exercise
- Number of Repetitions and Sets
- Rest Intervals between Sets
ACUTE PROGRAMME VARIABLES: GENERAL FOCUS

- Acute programme variables concerns the design of a single specific strength training session
- Allow the quantification of the load
- Make it possible to predict the training response and adaptation
- By manipulating these variables, numerous different workouts can be created
CHOICE OF EXERCISE

- Training goal
- Muscle groups to be trained
- Sports demands (SAID principle)
- Movement pattern to be trained
- Muscle balance (left & right, upper/lower body, agonist antagonist)
- Exercise technique experience (free wts, Machines, other modalities)
- Performance level (Beginner, Intermediate & Elite)
- Training phase (PP, CP, TP)
- Availability of equipment and training time
- Age and fitness level
CLASSIFICATION OF EXERCISES

- Structural (multi-joint, weight bearing)
- Supplemental (multi-joint, non-weight bearing)
- Isolation (single joint)
- Unilateral, bilateral
- Con, ecc, isometrics
STRUCTURAL EXERCISE

- Multi-joint exercises
- Weight bearing
- High skill involvement
- Stressing more muscle mass, High metabolic demand, Neural response, Hormonal response.
- Directly or indirectly loading the spine

AUXILLARY EXERCISE

- Also multi-joint but
- not weight bearing
- Involve less muscle mass compared to structural ex.

ISOLATION OR SINGLE JOINT EXERCISES

- Involve only one joint, less muscle mass
- Reduced skill level
ORDER OF EXERCISE

- Proper sequence of exercise for best training effect, order of exercise affects the quality of effort or technique of another exercise and to optimize the preservation of exercise intensity
- There are three basic workout structures
  1. Total body workouts
  2. Upper/Lower body split workouts
  3. Targeted Muscle group
- Large to small muscles
- Structural-supplemental-isolation
- Priority system
- Push-pull exercises (Alternated)
- Upper body –lower body
- classical-semi- classical-power ( highly complex/ technically demanding to least complex)
EXERCISE INTENSITY

- Most important variable
- Major stimulus for training adaptation
- Depends on training goal, exercise order, volume, frequency, repetition speed and length of rest interval.
- Intensity is relative
- Selection of intensity depends on:
  1. Exercise selected
  2. Individual’s training background
- Intensity is always calculated from maximum
- 1RM (percentage of the 1 RM)
- Repetition maximum
- RM range (goal repetition)
Methods of increasing resistance exercise intensity

1. Increase relative percentage
   - Week 1-3 - 70%
   - Week 4-6 - 75%
   - Week 7-9 - 80%

Increasing relative % is common in periodized programme

% can be used to vary intensity from set to set or to quantify a training cycle (hypertrophy cycle 65-75% strength 80 > 0 of I RM)
WAYS TO INCREASE INTENSITY: EXAMPLES

1. Increase Absolute Amount
   - Desired work zone = 8 reps
   - Increase weight when 8 reps are performed for all sets
   - Week 1-2 x 8 reps 50 kg
   - Week 2-4 x 8 reps 52-5 kg etc

2. Train within a RM range

3. The absolute increment depends on the character of exercise (large muscle mass can tolerate more increase than small muscle mass exercise)
WAYS TO INCREASE INTENSITY: EXAMPLES cont.

4. Train within a RM Range
   • Target Rep Zone
   • Target Zone = 8-12 reps
   • Week 1-2 = 8 reps
   • Week 3-4 = 10 reps
   • Week 5-6 = 12 reps
   • Increase weight for next 8 reps.
<table>
<thead>
<tr>
<th>Training Goal</th>
<th>Load (% of 1 Rm)</th>
<th>Goal reps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strength</td>
<td>&gt;80</td>
<td>1-6</td>
</tr>
<tr>
<td>Power</td>
<td>75-85</td>
<td>3-5</td>
</tr>
<tr>
<td>Hypertrophy</td>
<td>70-85</td>
<td>6-12</td>
</tr>
<tr>
<td>Muscular Endurance</td>
<td>&lt;60</td>
<td>&gt;12</td>
</tr>
</tbody>
</table>
NUMBER OF REPETITIONS AND SETS

- For proper training effect, select optimum no of repetitions and sets
- Number of sets/reps do not have to be the same for all exercises
- Depends on training goal, intensity of exercise, training status of the individual, number of muscle groups trained per workout.
- Several systems are sensitive to training volume (Nervous, Metabolic, Hormonal and Muscular)
- Single set may be appropriate for beginners and multiple set for advance athletes
- When multiple sets are used, its structure is to be determined (pattern of loading and volume prescription from one set to the next)
- Optimum number of reps and sets are important for proper training outcomes
- Higher intensity-low reps
- Depends on the type of exercise
- Low intensity-large reps
<table>
<thead>
<tr>
<th>Training Goal</th>
<th>Reps</th>
<th>Sets</th>
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</thead>
<tbody>
<tr>
<td>General fitness</td>
<td>8-15</td>
<td>1-2</td>
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<tr>
<td>Muscular endurance</td>
<td>&gt;12</td>
<td>2-3</td>
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<tr>
<td>Muscular hypertrophy</td>
<td>6-12</td>
<td>3-6</td>
</tr>
<tr>
<td>Muscular strength</td>
<td>1-6</td>
<td>2-6</td>
</tr>
<tr>
<td>Power</td>
<td>3-5</td>
<td>3-5</td>
</tr>
</tbody>
</table>
**LENGTH OF REST INTERVAL BETWEEN SETS**

Length of the rest interval influences the hormonal, metabolic responses to resistance training

- Depends on training goal
- (strength & power, hypertrophy & muscular endurance)
- Intensity of exercise
- Athlete’s training status
- Targeted energy system
- ACSM recommends 2-3 minutes rest between structural exercise and 1-2 minutes between assistance exercises.
- Strength Endurance (High reps 25-20 reps 1-2 minutes rest and for high intensity strength endurance 10-15 reps, less than one minute RI.)
<table>
<thead>
<tr>
<th>Training Goals</th>
<th>Rest interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>General fitness</td>
<td>30-90</td>
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<tr>
<td>Muscular endurance</td>
<td>&lt;30sec</td>
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<tr>
<td>Hyper trophy</td>
<td>30-90sec</td>
</tr>
<tr>
<td>Muscular strength</td>
<td>2-5 minutes</td>
</tr>
<tr>
<td>Power</td>
<td>2-5 minutes</td>
</tr>
</tbody>
</table>
THANK YOU