



## MANUAL MUSCLE TESTING: A USEFUL EVALUATION TECHNIQUE FOR CORRECTIVE AND ADAPTED PHYSICAL EDUCATORS

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### Abstract:

#### Introduction:

Physical Education by and large generally deals with the child population that is free from pathological lesions. However, with the introduction and more focus on Corrective and Adapted Physical Education in recent times, it has to also cater to the needs of abnormal children affected by various etiological factors. Whatever be the exact cause, neuromuscular or musculo-skeletal component is often impaired in one or the other way and is manifested by muscular weakness with varying degree of physical disability.

A thorough evaluation remains an important tool for the Corrective or Adapted Physical Educator to plan out and assess the efficacy of the activity programme for the re-education or rehabilitation of affected individuals. Though Physical Educators are very well familiar with the use of tensiometers, dynamometers etc. dynamometers etc. to ascertain the muscle strengths of healthy persons, Manual Muscle Testing is one of many clinical evaluation techniques often and extensively used in Physical Therapy and Correctives to manually assess the extent of muscle weakness in a sick, paralysed or an injured person.

Manual Muscle-Testeare credited to be initially evolved through the works of Dr. Robert Lovett, Janet Merrill, Wilhelmina Wright and Charles L. Lowman in early 20<sup>th</sup> century. Such tests were further refined by Henry O., Florence P. Kendall. Dr. Jessie Wright and many other workers in the field.

#### Grading System:

Two gradation methods of manual muscle testing are in common use today, i.e., 1. Daniels and Worthingham, 2.Kendall and McCreary. The test advocated by Daniels and Worthingham seems to be widely used in clinical practice for its simplicity and more practical gradation approach and the same is briefly presented here.

The following three aspects of muscle function serve as the main basis for the grading system.

1. If there is an evidence of muscle contraction at all.
2. The ability of a muscle or muscles-group to move the part of a limb through complete range of motion against gravity or in a gravity eliminated plane.
3. The amount of resistance that can be given to a contracted muscle/muscles-group manually during the movement.

The following 6 grades are used with this method.

#### Grade to be muscle function awarded:

0 (Zero)	no contraction at all
1 (trace)	Flicker of contraction
2 (poor)	Full range movement produced by muscle/muscles-group in gravity eliminated plane.
3 (fair)	Full range movement in against gravity plane
4 (good)	As with grade 3, +some resistance
5 (Normal)	Normal

Sometimes a plus (+) or minus (-) is also added to grades 1-4. If muscle has the ability to complete less than 50% or range of

movement, a +with immediate lower grade is awarded, and if the movement range is less than 100% , a-with the next higher grade can be awarded. For example, if a person can be awarded. For example, if a person can perform an against gravity knee extension movement only for initial few degrees (<90°), a grade of 2 + can be awarded to the Quadriceps group of muscles. And if the full knee extension lacks by fewer degrees (>90°bul >180°), the Quadriceps will be presumed to possess a muscle strength of 3- grade. A plus or minus is sometimes also applied depending upon the resistance felt by the therapist or examiner.

#### **Testing Procedure:**

Certain basic considerations used in the testing are as follow:

The therapist or examiner should in advance explain the purpose and procedure of the test to the patient to gain his maximal co-operation. The examiner should also carefully observe the muscles for their shape and size. The testing system presumes that the patient can perform isolated muscle or muscle-group contractions.

#### **Positioning:**

Correct positioning is essential for the validity in testing. The position should be such that allows the testing of maximum muscles to be examined without frequent turning of the patient and hence does not result in patient fatigue or an unnecessary lengthening of the examiner's time. For testing most of the muscles of the body for a patient a sequence of positions may include the order of Supine – Prone – side – lying-Sitting-Standing.

#### **Stabilization:**

Proper manual stabilization is very essential in testing to ensure adequate essential in testing to ensure adequate fixation of proximal body part (usually being the site of muscle origin). This helps in isolating the desired movement or action to a specific joint. However, too much of pressure in no way should cause any hindrance to muscle performance.

Patient should be given correct instructions for the desired motion or the examiner himself may demonstrate the movement before wanting the patient to perform the same movent. He should also carefully observe for any substitution of the movement which may otherwise result in false gradation of muscle strength. The substitution usually occurs in certain kinds of paralysis i.e. muscular dystrophy in which the prime movers may be non-functional but the assistant movers or the secondary muscles perform the movement. Substitution can be usually eliminated by proper stabilization and careful positioning.

While patient contracts his muscle or muscle-group the examiner should palpate the muscle tissue/tendon and ask the patient to move the body part through the possible range of motion, and apply the manual resistance to isometrically contracting muscles at the correct angle and direction. The 'resistance' is usually offered after maximal contraction in a direction opposite to the line of pull of muscle and at the distal end of the body segment.

The 'strength' of a muscle of one extremity should be compared with that of the contralateral limb or to the examiner's standard. While offering the resistance the age, sex and body build of the patient must be kept in the mind.

The test for a muscle may usually begin in against gravity plane and resistance offered. However, if the same is not possible the testing in gravity free plane should be done. If the full range of plane should be done. If the full range of motion is not completed even with the passive force, a note of the same should be made.

For example, for testing the strength of Quadriceps femoris muscles i.e. knee extnesors the patient is seated with legs over the edge of table with trunk slightly leaning backwards with hands resting over the table to stabilizers thigh without pressure over Quadriceps and patient extends knee through range of motion. Examiner next offers resistance above ankle joint. If the offers resistance above ankle joint. If the knee extension is not possible as described above the patient is taken to side lying position with the limb to be tested

lying on the table and the other limb being supported by the examiner. The examiner then stabilizes the thigh above the patient is taken to side lying position with the limb to be tested lying on the table and the other limb being supported by the examiner. The examiner then stabilizes the thigh above knee joint and ask the patient to extend the knee through range of motion for gradation in gravity eliminated plane.

The test thus helps the educator or therapist:

- 1) To ascertain the extent of muscle weakness. Sometimes it is of diagnostic help where by a pattern of paralysis or muscle weakness can be revealed as in a nerve lesion or bilateral symmetric lesion.
- 2) To plan out an accurate and effective re-education or rehabilitation activity programme, and
- 3) To examine the efficacy of the re-education programme or prognosis whether a child has responded as per plan or needs some modification.

#### **Conclusion:**

The above test therefore appears to be both objective and somewhat subjective in nature. The test though is primarily for assessing the muscle weakness following lower motor neuron lesions and does not permit an accurate testing of isolated movements in upper motor neuron lesions, however it is very simple, valuable and inexpensive tool available to the therapists. It is thought the test will be of great help to Corrective or Adapted Physical Education to serve as a basis for selecting a proper skill/technique for re-educating a disabled child's weak musculature. Based on the available muscle strength of a child, it will help the educator determine if an activity should be designed in a gravity free or against gravity plane or it needs to be assisted or resisted, or whether it should be assisted or resisted, or whether it should be very light or hard an activity. And therefore, accordingly selection of a particular game a sport for its specific skill/technique can be made appropriately and incorporated for the re-education or rehabilitation of specific weak muscles.

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