

Comparative Study of Grip Strength in Different Positions of Shoulder and Elbow with Wrist in Neutral and Extension Positions

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Abstract

This study investigated the effect of shoulder, elbow positions with respect to wrist positioned in neutral and in extension in 25 males and 25 females. A hydraulic dynamometer was used to measure the grip strength in six testing positions with respect to wrist positioned in neutral and in extension. The six grip strength tests consisted of three positions in which the elbow was maintained in full extension with varying degrees of shoulder flexion (0°, 90° and 180°) and other three positions where the elbow was maintained in 90° flexion combined with varying degrees of shoulder flexion (0°, 90° and 180°). Only the dominant hand was tested. The highest mean grip strength score was recorded when the shoulder was positioned in 180° of flexion with elbow in complete extension with respect to wrist being positioned in neutral (30.20 ± 8.74) and wrist in extension (25.44 ± 7.51), while the lowest mean grip strength score was recorded when shoulder was positioned in 180° flexion with elbow 90° flexion with respect to wrist being positioned in neutral (21.92 ± 7.45) and wrist in extension (19.40 ± 6.21). Finally grip strength differed significantly for both sexes and study showed males have greater grip strength than females with respect to wrist being positioned in neutral and in extension. In essence, our study affirms that various joint positions can affect grip strength, especially elbow and shoulder joints with respect to wrist positions (neutral and extension). Clinically useful information may be derived from these findings and are valuable in evaluation and rehabilitation training of hand injured patients

Key Words: Grip Strength, Hand Strength Testing, Shoulder Position, Elbow Position, Wrist Position

Introduction

Grip strength is frequently evaluated in clinical settings as an indicator of disease activity (*Rhind et al, 1980*). It is evaluated as a component of hand function. In addition to being an economical measure that is easy to administer, it is one of the best indicators of the overall strength of the limb (*Rice et al, 1989*). Grip strength is the integrated performances of muscles that can be produced in one muscular contraction (*Nwuga, 1975*). It is widely accepted that grip strength provides an objective index of the functional integrity of the upper extremity (*Myers et al, 1973; Mayers et al, 1982*).

To obtain an objective assessment of hand function there is a need for a standardized measure of hand strength.

American society of hand therapist suggested a standardized testing protocol for handgrip strength in which subject is seated with the shoulder adducted and neutrally rotated, the elbow flexed at 90° and forearm in neutral and the wrist between 0 and 30 degrees extension and between 0 degrees and 15 degrees ulnar deviation (*Fess & Moran, 1981*). However, there may be clients who are unable to assume or hold this standardized testing position. Standardized grip strength testing procedures have been recommended to provide even greater objectivity of measurement. In a clinical setting, however, there are a number of reasons why it may be impossible to follow standardized testing procedures, such as patient's inability to tolerate an upright position or the presence of contractures in upper extremity joints.