

General: Midlife handgrip strength as a predictor of disability.

As the body ages so musculoskeletal strength progressively declines. Muscle mass and quality decrease with concomitant reductions in muscle strength. This in turn leads to a gradual loss in functional ability resulting in physical disability. The normal activities of daily life such as getting up from a chair or lifting something up can become major obstacles and so the quality of life can deteriorate as the body becomes increasingly frail with age. Indeed, with regard to these daily functional activities “muscle strength may be more important than aerobic fitness.” (Forrest *et al.* (2005)) With populations aging, dealing with declining physical ability is bound to become an increasingly important public health issue. Therefore, learning the patterns of muscle strength loss with aging and being able to identify the risk factors for such loss, is essential if we are to understand how to preserve muscle strength and keep our increasingly elderly populations as physically functional for as long as possible.

Fortunately, in this regard, researchers have been able to establish that hand grip strength (which is measured by a simple non-invasive measurement of upper body strength) correlates well to total body muscle strength. In 1999, Rantanen *et al.* published details of their study into whether hand grip strength measured during midlife could predict old age functional limitations and disability. The study was based on the Honolulu Heart Program, a 25 year prospective cohort study of Japanese – American men living in Oahu, Hawaii. The participants were 6089 45 – 68 year old males who were healthy at baseline measurement and whose hand grip strength had been measured from 1965 to 1970. Although 2259 men died over the follow-up period, 3218 survivors were able to take part in the disability assessment in 1991 through 1993. Once adjustment had been made for multiple potential confounders, risk of functional limitations and disability 25 years later were found to have increased as baseline hand grip strength decreased. The research team therefore concluded that in healthy middle aged men (aged 45 – 68 years) “hand grip strength was (indeed) highly predictive of functional limitations and disability 25 years later”.

To add to the findings of Rantanen and her team, another study, also published in 1999, provided evidence of the fact that hand grip strength in older men is a predictor of disability. The study, undertaken by Giampaoli *et al.* consisted of 140 men aged 71 – 91 years taken from the FINE (Finland, Italian, Netherlands Elderly) study who reported no disabilities in performing the activities of daily living (ADLS), instrumental activities of daily living (IADLs) and mobility activities at baseline examination and who subsequently provided information on their functional status at follow-up 4 years later. Disability was defined as needing assistance with ADLs, IADLs and mobility. The

researchers again found that poor hand strength as measured by hand-grip acted as a predictor of disability in older people.

In a much more recent study, Dr. Kimberly Forrest and her team sought to evaluate longitudinally the rate of muscle strength loss and the risk factors for loss in older men. The study participants were 321 men (age range 51–84 yrs) recruited from population-based listings in the Pittsburgh region, USA. Hand grip strength was measured at baseline and after an average follow up period of 7 years. The researchers found that hand grip strength declined at a rate of 2.8% per year (a total of 20% decline during the 7-year follow-up). Their results also showed that the rate of loss accelerated with age. After adjusting for baseline measurement, hand grip strength loss ranged from 2.0% decline per year for men aged <60 years to 3.4% decline per year for men aged 70 years or older. Other risk factors contributing to the loss of muscle strength in older men were found to include back pain, use of calcium channel blockers, caffeine intake, and height and weight loss.

Forrest acknowledges that some of the changes in hand grip strength maybe due to “unmeasured environmental and lifestyle characteristics, additional medical conditions, and/or biochemical measures of endocrinologic and genetic factors, such as cytokines, that were not studied in the current analyses”.

It is clear, therefore, that further research is still required. However, based on the current evidence, the hand grip strength test is an easy, inexpensive non-invasive screening tool that could be used to identify those potentially at risk of disability in old age.

References:-

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