

THE EFFECT OF AGE ON VETERAN ATHLETES LEG ELASTICITY

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INTRODUCTION: Farley & Morgenroth (1999) studied contributions to leg elasticity during maximal and sub maximal vertical jumping in a young population. Using a computer model for leg elasticity they found that ankle joint stiffness was the main contributor to leg elasticity and showed that it was directly proportional to overall leg stiffness. The aim of this study was to track changes in leg elasticity of veteran runners over a ten year period (Work in progress).

METHOD: Six veteran runners aged 60-65 years and eight veteran runners aged 50-55 years performed 10 maximal depth jumps. The jumps required a 'modified' approach since the veterans found it difficult to drop from a height. Kinematic and kinetic data were collected using a Vicon 512 seven camera infra red system (120Hz) which was synchronized with a Kistler (9281 B11) force platform (1080Hz). 36 reflective markers were used to create a full body model. The lower body model was developed by Davis, R.B. et al (1991) and the upper body by Vicon.

RESULTS: A simple-spring mass model was applied to assess leg stiffness. The spring-mass model is dependant upon a symmetrical movement during foot-ground contact. The 'modified' approach used in this study resulted in an asymmetrical movement. A linear correlation coefficient (r) was calculated to assess the suitability of the spring-mass model. As ' r ' values were greater than 0.93 for both groups, the linear model was deemed suitable.

Table 1 Mean values for 3 selected variables from each age group

Age	K_{leg} (BW•m ⁻¹)	Spring Compression (m)	Peak F_R (BW)
60-65 years	28.4	0.145	3.269
50-55 years	20.7	0.196	3.117

Where, K_{leg} is leg stiffness, spring compression is the change in spring length from touch down to a minimum (spring length is the resultant distance from the centre of mass to the mid-toe) and Peak F_R is the resultant force at minimum spring length.

DISCUSSION: Higher leg stiffness values demonstrated by the older veteran group were mainly accounted for by reductions in spring compression. Farley & Morgenroth (1999) noted that leg stiffness was affected by flexion at the hip, knee and ankle joints indicating that changes in these variables are likely to be one of the contributing factors in reducing spring compression in the veteran runners.

CONCLUSION: Veteran runners aged 60-65 years had greater leg stiffness than those aged 50-55 years evidenced by their maximal vertical jumping ability. Further analysis aims to determine the underpinning mechanisms for the reduced compression by studying variables such as joint flexion and joint stiffness.

REFERENCES:

Farley, C.T. & Morgenroth, D.C. (1999). Leg stiffness primarily depends on ankle stiffness during human hopping. *Journal of Biomechanics*, 32, 267-273.

Acknowledgement

Vicon, Kistler, veteran athletes