

# **The Effect of Stepwise Increases in Vertical Dimension of Occlusion on Isometric Strength of Cervical Flexors and Deltoid Muscles in Nonsymptomatic Females**

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**ABSTRACT:** This mixed, single-double blind study examined the effect of a stepwise increase in vertical dimension of occlusion (VDO) on the isometric strength of cervical flexor and deltoid muscles in 20 asymptomatic females with deep bite (age range 20-40 years). Vertical dimension of occlusion was increased by mandibular acrylic bite plates, 2, 4, 6 and 12mm. Subjects were instructed to bite while resisting: 1. an increasing horizontal force was applied to the forehead; and 2. an increasing vertical downward force to the wrist of each extended arm. Forces were applied by a hand-held strain gauge until resistance yielded. The force applied at the point of yielding was recorded as isometric peak strength of that trial. The peak strength for each muscle group was measured twice and averaged to produce a mean peak strength measure. This procedure was repeated in the subject's habitual occlusion and for the four increased VDOs. Mean strength of cervical flexors with increased VDO (12.0 kg) was significantly greater than that for existing vertical dimension occlusion (9.6 kg). With the exception of preexperimental existing VD of occlusion, strength for right and left deltoids did not differ, but mean deltoid strength in the increased condition (8.6 kg) was significantly greater than biting in without a bite plate (6.6 kg). In the peak condition, cervical flexor strength increased 24% and deltoid strength increased an average of 29% from that of biting without an increase. As VDO increased further, strength in all sites was found to diminish. Repeating the strength test without a bite plate, after all trials were administered, did not show differences from pre-experimental levels, indicating that fatigue was not an important factor. The findings demonstrate that isometric strength of the cervical flexors and deltoids increases significantly from habitual occlusion as the VDO is increased, then diminishes as VDO is increased further. The strength of both cervical flexors and deltoids varied in concert with changes of VDO.