

O-28

Association Between Modified Frailty Index-11 and Cervical Malalignment in a Community-Based Cohort

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Background: Frailty has garnered increasing attention in the context of an aging population. Among the various tools available for assessing frailty, the modified frailty index-11 (mFI-11) is widely utilized.

Research question: The evidence regarding the association between mFI-11 and spinal alignment parameters remains limited. This study aimed to evaluate the relationship between frailty, as assessed by mFI-11, and full-spine radiographic alignment, with a particular focus on cervical malalignment, using data from a community-based health screening cohort.

Design: Retrospective cohort study

Methods: The study included 193 volunteers aged 70 years or older who participated in a community health screening. Participants were stratified into three groups based on their frailty status as defined by the mFI-11: robust (R), prefrail (P), and frail (F). Full-spine radiographic parameters and the prevalence of cervical deformity (CD) were assessed in each group. Cervical deformity was defined as either a C2-7 sagittal vertical axis (SVA) ≥ 40 mm or a T1 slope (TS) minus cervical lordosis (CL) $\geq 20^\circ$.

Results: The study cohort comprised 58 participants in the R group (mean age: 77.8 years), 110 in the P group (mean age: 78.6 years), and 25 in the F group (mean age: 78.4 years). The proportion of females was significantly lower in the F group (R: 63.8%, P: 57.3%, F: 28%; $P = 0.007$). Thoracic, lumbar, and pelvic alignment parameters did not differ significantly among the groups. However, cervical alignment parameters showed significant variations: TS-CL values were 8° (R), 11° (P), and 16° (F) ($P = 0.012$), while C2-7 SVA values were 20 mm (R), 19 mm (P), and 31 mm (F) ($P = 0.001$). The prevalence of CD was markedly higher in the F group (R: 17%, P: 26%, F: 52%; $P = 0.004$).

Discussion: The mFI-11 effectively reflected cervical alignment abnormalities, with the frail group showing a higher prevalence of cervical deformity and a greater proportion of males.