Title: Investigation of validity of model for estimating shear force applied to buttocks in elderly people

with kyphosis while sitting comfortably on a chair

Authors: Kenichi KOBARA, RPT, PhD[1]*, Koichi SHINKODA, RPT, PhD[2], Susumu WATANABE, RPT, PhD[1],

Atsuko EGUCHI, RPT, PhD[3], Daisuke FUJITA, RPT, MA[1], Tetsuya NISHIMOTO, RPT, MA[1]

1) Department of Rehabilitation, Faculty of Health Science and Technology, Kawasaki University of Medical

Welfare, 288 Matsushima, Kurashiki, Okayama 701-0193, Japan

2) Department of Physical Therapy and Occupational Therapy Sciences, Hiroshima University Graduate School of

Health Sciences, 2-3 Kasumi 1-chome, Minami-ku, Hiroshima 734-8551, Japan

3) Department of Physical Therapy, Fukuoka Rehabilitation College, 29-17 Hakataekimae 3-chome, Hakata-ku,

Fukuoka 812-0011, Japan

***Correspondence to:** K. Kobara

Tel: +81 86462 1111. **Fax:** +81 86464 1109. **E-mail:** rptkob@mw.kawasaki-m.ac.jp

Abstract

Purpose: The purpose of the present study was to investigate the validity of a model for estimating shear force on the

buttocks of elderly people with kyphosis.

Method: The subjects with kyphosis were 10 elderly people in a facility providing health care services for the elderly.

The shear force was measured using a force plate and, simultaneously, the position of the resultant center of mass of the

upper body and the inclination angle of the trunk were measured. The estimated shear force was calculated by

substituting these values in the model.

Results: The average value of the measured shear force was 8.4 SD 1.4 [%BW], and the average value of the

estimated shear force was 5.8 SD 1.0 [%BW]. Although there was a significant difference between these two values

($p<0.01$), there was a strong positive correlation between them ($r=0.786$, $p<0.01$). The regression line between the two

values was $y = 1.097x + 1.96$, where $x =$ estimated value, $y =$ measured value.

Conclusions: These results suggest that the estimated shear force was close to the measured shear force and thus is

approximately known by substituting the calculated values for the linear regression.