Re
Halbertsma, J.

Published in:
Disability and Rehabilitation

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
1999

Link to publication in University of Groningen/UMCG research database

Citation for published version (APA):
Halbertsma, J. (1999). Re: Dickson HG. Re: Dickson's problems with the ICIDH definition of impairment. Disability and rehabilitation 1997; 19, 122-123. Disability and Rehabilitation, 21(3), 139-140.

Copyright
Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment.

Take-down policy
If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): http://www.rug.nl/research/portal. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.
Was Hamstring Muscle Stiffness Measured?

I commend Halbertsma et al1 for their efforts to study the passive properties of the hamstring muscles of patients with low back pain. I do, however, have concerns about how stiffness of the hamstrings was measured and the conclusions that were based on this measurement.

Halbertsma calculated the passive hamstring moment (Nm) and represented the hamstring stiffness (Me-pas) as the maximal passive hamstring moment at the onset of integrated electromyographic activity during straight-leg raising. Based on this measurement, which was not significantly different among the 3 groups tested (flexible group [FG], stiff group [SG], patient group [PG]), the authors concluded that passive stiffness of the hamstrings did not differ. This conclusion appears to be invalid because passive stiffness was not measured. Instead, Halbertsma measured the maximal passive resistive torque (PRT), which is not the same as passive stiffness. Passive stiffness is a physiologic relationship of the change in the PRT (ΔPRT) in relation to a change in the angular displacement (ΔAngle). To measure passive stiffness, the authors would need to express passive stiffness by the ΔPRT/ΔAngle,2-3 or by other comparable units of passive resistance (ie, stress in Nm/cm²) and angular change (ie, radians). For example, the ΔPRT/ΔAngle can be calculated at 1° intervals or averaged over multiple degrees as the muscles are stretched. The PRT contributes to the passive stiffness, but the 2 properties are not synonymous.

Further inspection of the results indicates that the pelvic-femoral maximal angular displacement (ϕ-max) during straight-leg-raising was less for the PG (40.3° ± 10.41°) than for the SG (48.2° ± 6.69°) and the FG (55.0° ± 5.40°). If the PRT was measured from the onset of the movement (which appears possible from fig 4), then the average passive stiffness would be measured by dividing the maximal PRT by the total angular displacement. This may not have been true for all subjects, but is offered here to illustrate my concern. Simple calculations from table 2 reveal that the average passive stiffness (Nm/deg) for the 3 groups would be: FG = .63, SG = .79, and PG = .87. This indicates that the average passive stiffness for the PG was greater than the average passive stiffness for the SG and the FG. Although these calculations would need to be confirmed, they suggest that the hamstrings of the PG may have been stiffer. Although the Mϕ-pas did not differ among groups, the decreased pelvic-femoral angular displacement for the PG would increase their average passive stiffness.

Again, I commend Halbertsma for the effort to study this interesting topic. I hope, however, that my comments help to clarify the meaning of their results, and that future investigations and reports include careful attention to the meaning of passive muscle stiffness.

Richard L. Gajdosik, PT, PhD
School of Pharmacy and Allied Health Sciences
University of Montana
Missoula, MT

References


do:10.1053/apmr.
significantly earlier compared with the SG. Next, we compared the passive muscle stiffness for PG and SG at $\varphi_{EMG}$ (the onset of I-EMG of the PG). It should be noted that $\varphi_{EMG}$ between FG–SG and PG were not the same. Therefore the stiffness at $\varphi_{EMG}$ between FG–SG and PG was also different.

We hope by this explanation that some misunderstanding is resolved. We thank Gajdosik for his remarks and constructive contribution.

Jan P.K. Halbertsma, PhD
Ludwig N.H. Göeken, MD, PhD
At L. Hof, PhD
Willem H. Eisma, MD
Dept of Rehabilitation Medicine
University of Groningen

References

Johan W. Groothoff, PhD
Northern Centre for Healthcare Research
Groningen, The Netherlands

doi:10.1053/apmr.