

Quantification of Force during Soft Tissue Massage for Research and Clinical Use

M. Terry Loghmani¹, Sohel Anwar², Ahmed Mohamed²

Departments of Physical Therapy¹, Mechanical Engineering²

Indiana University Purdue University Indianapolis, 1140 W. Michigan St. CF326, Indianapolis, IN 46202

Phone: 317-278-3463 Fax: 317-278-1876 Email: mloghman@iu.edu

BACKGROUND

The forces delivered during massage-based therapies have not been adequately quantified [1]. Instrument-assisted soft tissue mobilization (IASTM), a type of massage that uses rigid devices, has demonstrated therapeutic benefit [2]. The purpose of this research was to fabricate and compare design concepts for a mechano-therapeutic instrument that provides real-time quantification of the force delivered during IASTM for research and clinical use.

METHODS

Two real-time force sensing systems were developed and fabricated using a selected IASTM instrument (Graston Technique®, Graston Technique Inc., Indianapolis) as a prototype. The systems were compared based on their precision, cost and ability to apply force to the soft tissue in a clinically replicable, user-friendly and feasible manner. A test rig was designed and fabricated to evaluate the magnitude and angle of the forces measured by the system.

RESULTS

The method which used a force sensing system embedded into the IASTM device was found to be more accurate and clinically-applicable as compared to an externally attached load-sensing apparatus. The cost varied depending on the material used, which could impact the sensibility of the system.

CONCLUSIONS

A force quantification system was developed which will allow for consistent IASTM forces and dose response levels to be determined. Future studies will further validate the system in animals and humans. Ultimately, this will permit IASTM protocols to be standardized and compared. Quantification of the forces delivered during manipulation of the soft tissue is essential in order for massage-based modalities to be recognized and established as cost-effective, non-invasive treatment options for a variety of conditions in an ever aging population.

REFERENCES

- [1] Wang Q, Zeng H, Best TM, Haas C, Heffner NT, Agarwal S, Zhao Y. A mechatronic system for quantitative application and assessment of massage-like actions in small animals. *Ann Biomed Eng*, 42(1): 36-49, 2014.
- [2] Loghmani MT, Warden SJ. Instrument-assisted cross fiber massage increases tissue perfusion and alters microvascular morphology in the vicinity of healing knee ligaments. *BMC Complement Altern Med*, 13:1-9, 2013.