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LETTER TO EDITOR

Introducing a Device for Measuring Pain Intensity; a Letter to Editor

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Dear editor;

Pain is defined as an unpleasant feeling caused by a real or potential tissue injury and is classified into neuropathic, somatic and visceral types (1, 2). Characteristics such as severity, location, duration and site of pain referral are very helpful in correct diagnosis and treatment of the disease. Pain control in the emergency department is one of the first measures that should be taken for the patients and for this purpose, a wide range of analgesic drugs such as NSAIDs, opioids, and corticosteroids are used (3-5).

For evaluating the success rate as well as determining the best medication required for controlling the patient's pain, being aware of the pain severity is of great importance. Therefore, a device or a method that can monitor pain severity and therefore, the process of patient treatment with high accuracy is very interesting. Currently, various methods exist for assessing pain severity. One way is to ask the patient (self-report) for determining pain severity. Among the most important methods based on self-report of the patient, numerical rating scales (NRS) and verbal rating scales (VRS) can be mentioned (6, 7). In cases that self-report by the patient is not possible, methods such as Behavioral pain scale (BPS) and critical care pain observation tool (CPOT) can be used (8).

One of the common methods for assessing pain severity and threshold in animal studies is using monofilaments (9, 10). These monofilaments are made from polyethylene and the base of their function is the bend that occurs at the time of applying pressure on the surface of the intended organ (figure 1). A wide range of these filaments is available, each of which apply a pre-determined force depending on the bend. Results of a study were indicative of 41% to 93% sensitivity and 68% to 100% specificity of monofilaments in determining pain threshold (10). However, temperature and humidity of the environment can affect the bending and therefore, the accuracy of the monofilaments (11).

Considering the afore-mentioned points, researchers of the present study attempted to design a digital device for assessing pain severity and threshold with characteristics such as accuracy, reproducibility, sensitivity, specificity, and ease of use. Among the most important uses of this device, quantitative measurement of response to the external stimulant, pain threshold, and assessing the trend of response to treatment with various analgesic drugs can be pointed out.

The device is made up of 2 parts of body and probe, the body includes an LCD with touch screen and internal memory for recording the performed tests. Its accuracy in measurement is about 100 mg and it can show a maximum of 1000 g. The device can record the maximum force inflicted on the desired organ and can be connected to the computer and data can be printed out. In addition, the trend of force inflicted on the organ of the animal or human can be observed as a curve on the graph (figure 2).

Inside the probe there is a load cell with high sensitivity for measuring the inflicted force used and a there is also a steel rod, 1 mm in diameter, placed on the probe, which has a smooth cross section. This metal rod can be changed and various diameters can be used for animal and human study purposes.

1. Method of using the device

For evaluating the patient's pain severity a force will be inflicted on the intended organ of the patient and when a pain equal to the original pain of the patient is felt and the patient responds to the performed stimulation and moves the intended organ, the maximum force is recorded. This test is performed 5 times and the mean inflicted force is recorded

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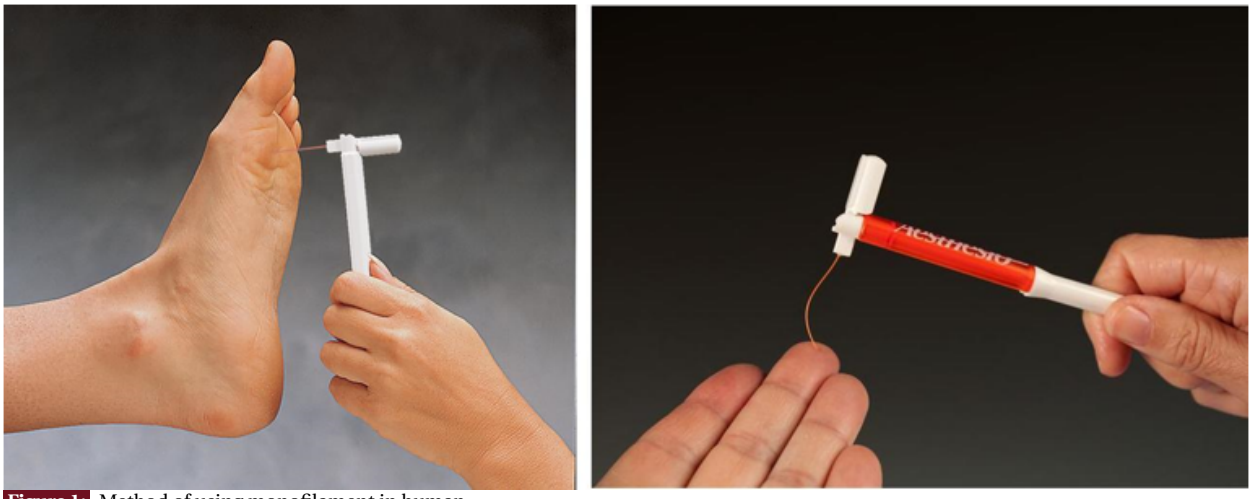

Figure 1: Method of using monofilament in human.

Figure 2: A view of the digital device

as pain severity.

This device has been registered in the Iranian office of intel-

lectual and mental property under the number 87068. In addition, it has been chosen as the favorite invention in the festival of inventions of the Iranian national elites foundation (in 2015).

2. Appendix

2.1. Acknowledgements

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2.2. Author's contribution

All authors passed four criteria for authorship contribution based on recommendations of the International Committee of Medical Journal Editors.

2.3. Conflict of interest

None.

2.4. Funding and support

None.

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