Is it the time to use wrist devices for health diagnosis in clinical practice?

Chin-Chou Huang*a,b,c,d, Yenn-Jiang Lin*a,c

*aDepartment of Medical Education, Taipei Veterans General Hospital, Taipei, Taiwan, ROC; bDivision of Cardiology, Department of Medicine, Taipei Veterans General Hospital, Taipei, Taiwan, ROC; cSchool of Medicine, Faculty of Medicine, National Yang-Ming University, Taipei, Taiwan, ROC; dCardiovascular Research Center, National Yang-Ming University, Taipei, Taiwan, ROC

The traditional Chinese medicine includes four examinations: inspection, listening and smelling examination, inquiry, and pulse taking and palpation. Wrist pulse diagnosis is one of the four important approaches for health diagnosis. The diagnosis was reached when a physician uses three fingers at three positions of the patient to perceive the pulse by pressing on three indicators. In the past years, there are increasing interests focusing on developing sensors to acquire pulse signals and exploring machine learning techniques to analyze health conditions based on the acquired pulse signals.1,3,11 There are different kinds of sensors for pulse signal acquisition, such as pressure, photoelectric, and ultrasonic sensors. Each sensor may be more appropriate for the diagnosis of some specific disease. Ultrasonic sensor could be used for diabetes, pressure sensor could be used for arteriosclerosis, and the diagnosis performance could be improved by the combination of three types of signals.1

There was also one study about the use of pulse spectrum analysis of radial artery as a tool to facilitate coronary artery disease (CAD) diagnosis before receiving cardiac catheterization.10 In the current issue, Tsai et al17 reported their findings about the use of time-domain analysis for wrist pulse diagnosis. A total of 57 participants were recruited, including 37 participants with CAD and 20 healthy participants. Pressure pulse waves were measured at three positions and nine indicators on both hands (18 locations). The findings showed that the wrist radial artery waves were not identical across different positions and indicators whether it is in CAD group or healthy group. This study demonstrates the complexity of wrist pulse diagnosis.

There are some studies trying to investigate the anatomy of the three positions for wrist pulse diagnosis. One recent study investigated the anatomy of the Cun position at wrist in 32 upper limb specimens of 16 human cadavers, including eight males and eight females. The study showed that blood vessel taking pulse in Cun was from the radial artery or the superficial palmar branch, depending on the vascular distribution in Cun, the region of finger positioning, and the patient’s pulse condition.18 The findings showed that individual differences should be considered for wrist pulse diagnosis.

In addition to pulse diagnosis, wrist is also an area for blood pressure (BP) measurement. It is an alternative approach in addition to upper arm BP measurement, which is the gold standard for BP measurement. However, there are still many arguments about the reliability of BP measurement with wrist devices. One study showed that the use of wrist devices for home self-measurement led to frequent detection of falsely elevated BP values in unselected subjects from the general population.19 Another study showed that radial systolic BP is not representative of brachial systolic BP in participants undergoing coronary angiography, with most participants having a radial systolic BP >5 mmHg higher than brachial and many with differences >15 mmHg.20 These findings suggest that wrist BP measurement could not replace upper arm BP measurement.

The theory of the Chinese pulse diagnosis is mainly based on the experience of Chinese physicians for thousands of years.20 However, there are little evidences about the reliability of Chinese medicine pulse diagnosis from literature review. Some factors related to the reliability of pulse qualities include the sensation complexity and the amount of sensory input provided to the testers’ fingers by the impulse.10 More efforts are still needed to improve the reliability of wrist devices in the future.

ACKNOWLEDGMENTS

This work was supported by Ministry of Science and Technology of Taiwan support for the National Yang-Ming University and Taipei Veterans General Hospital (MOST 107-2314-B-010-061-MY2, MOST 106-2314-B-010-046-MY3); Grant of Taipei Veterans General Hospital (V108C-032, C17-095); Research Foundation of Cardiovascular Medicine (107-02-036), and Szu-Yuan Research Foundation of Internal Medicine (No. 108016).

REFERENCES


www.sjcm.org


