

Suggestion for Objective Evaluation of Comparative Pulse Diagnosis

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Objectives: Pulse is a method of Korean medicine diagnosis and is an important clue to detect the organs, nature, and progress of the disease. Pulse examination is included in the basic examination of Korean medicine doctors, but there is no standardized method for diagnosing pulse although the types and methods of the pulse taking are briefly described in the literature, making it difficult to spread the examination method. In this regard, I would like to propose an objective evaluation method.

Methods: Although the importance of pulse examination and the method of pulse examination are known in the literature, it is difficult for undergraduate students or inexperienced Korean medicine doctors to access it, so in this paper a method of marking the size of the pulse power in the blank space for objective evaluation was devised and presented.

Results: The size of the pulse power should be indicated using the 1-cell, 3-cell, or 5-cell method according to the left and right wrists and the *cun*, *guan* and *chi* on both sides.

Conclusion: The method of pulse diagnosis is an important diagnostic method as a verification process for making a Korean medical diagnosis. The remaining Korean medicine diagnostic methods, including pulse diagnosis, also need to undergo objectification. It is believed that the objectification of these diagnostic methods will lead to an improvement in the treatment rate of Korean medicine.

Keywords: pulse, diagnosis, evaluation, Korean medicine

INTRODUCTION

Pulse examination is one of the representative diagnostic techniques in Korean medicine, alongside inspection, listening and olfaction, and inquiry examinations. It serves as the foundation for observing various pulse patterns, determining the location and nature of the patient's disease, and assessing the state of vital (righteous) and evil energies. There are 27 or 28 types of pulses, which have the disadvantage of being subjective because they rely on the doctor's finger sensations. Therefore, mastering pulse examination requires not only theoretical study of pulse locations and patterns but also practical training [1].

The easiest way to objectify pulse examination is by using a pulse examination device. Domestic research has presented four papers related to objective pulse diagnosis, including

identifying China's pulse objective research trends [2], research using gauges [3], basic research for mechanical measurement methods [4], and research on the development of a 3D pulse wave diagnosis system [5].

In addition, a device has been designed that applies pressures of 50 g, 100 g, and 150 g to three levels of pulse depth: superficial, middle, and deep [6]. Nevertheless, it remains unclear whether the pressure, adjusted according to the patient's wrist circumference and the depth of the radial artery, accurately reflects the superficial, middle, and deep depths. Many researchers aim to perform pulse diagnosis by analyzing the pulse waveform; however, due to the lack of clearly established standards for distinguishing pulse patterns, they rely on several parameters to identify the shape of the pulse. As a result, the limitation in the number of variables used to distinguish the

shape of the pulse means that differences due to variables such as gender, age, weight, and height are not reflected, even in cases of floating pulse and deep pulse [7].

Doctors of Korean medicine have identified several issues with diagnosing pulse using a device. These include the lack of reproducibility, as the pulse can vary depending on the sensor's location, and doubts about whether the device's pulse diagnosis corresponds to the pulse perceived by the Korean medicine doctor [8].

The major drawback of pulse diagnosis is its extreme subjectivity [9]. Feeling the pulse requires subtle skill and is difficult to master. Students and novice Korean medicine doctors may become frustrated because they are unable to discern whether the pulse is "rough" or "slippery" [9].

This paper aims to provide an objective method for students learning pulse diagnosis for the first time, as well as for novice Korean medicine practitioners, by presenting a way to quantify and express the strength of the pulse.

MATERIALS AND METHODS

1. Overview of pulse

Pulse examination is a method where a doctor uses the tips of three fingers—the index, middle, and ring finger—to feel the patient's radial artery in order to discern the pulse. It serves as a technique for diagnosing the balance between yin and yang, exterior and interior, cold and heat, and deficiency and excess through the comprehensive analysis of data obtained from the other three diagnostic methods. Since the examination relies on the tactile sensitivity of the doctor's fingers, establishing standards for the location and pattern of the pulse is essential [1, 9].

2. Types of pulse

The three representative types of pulses are the Nine Regions Pulse Method, the three regions method, and the wrist pulse-taking method. The 'nine regions pulse method' involves selecting three areas on the head, hands, and legs of the human body to take pulses, resulting in a total of nine pulses. This method primarily observes pulsation locations in the human body. The 'three regions method' focuses on observing the carotid artery pulse, wrist pulse, and anterior tibial pulse. The carotid artery pulse provides insights into the stomach qi, the wrist pulse (*cunkou* pulse) relates to the Taeum (12 meridians), and the anterior tibial pulse (*Fuyang* pulse, instep pulse) indicates potential crises. The most elaborately developed method is the wrist pulse-taking method, established through "Huangdi's Internal Classic," "Classic of Difficult Issues," and "Pulse Classic." It is possible to determine the status of each of the six viscera and six bowels by examining three parts of the *cun*, *guan*, and *chi* on each wrist, assigning the corresponding viscera to a total of 6 parts (Table 1) [10].

3. Allocation of the viscera on the pulse area

Although there are differences in the allocation of corresponding viscera to the six divisions of the pulse area depending on the source, many aspects remain consistent, particularly in observing the upper burner from the *cun*, the middle burner from the *guan*, and the lower burner from the *chi*.

4. Pulse diagnosis and comparative pulse diagnosis

Pulse diagnosis is a method that detects 28 pulse patterns, which are difficult to learn. The burden of having to choose from among these 28 types makes the process challenging for doctors. To simplify this, researchers have identified a more

Table 1. Different corresponding relations between three portions and viscera

	<i>Cun</i>		<i>Guan</i>		<i>Chi</i>	
	L	R	L	R	L	R
Classic of difficult issues	Heart SI	Lung LI	Liver GB	Spleen stomach	Kidney UB	Kidney LG
Pulse classics	Heart SI	Lung LI	Liver GB	Spleen stomach	Kidney UB	Kidney TE
Binhu's sphygmology	Heart danzhong	Lung chest	Liver GB	Spleen stomach	Kidney UB & SI	Kidney LI
Complete works of jingyue	Heart PC	Lung danzhong	Liver GB	Spleen stomach	Kidney UB & LI	Kidney TE, SI, LG
Golden mirror of medicine	Heart dangzhong	Lung chest	Liver GB & DP	Spleen stomach	Kidney UB & SI	Kidney LI

SI, small intestine; LI, large intestine; LG, life gate; TE, triple energizer; GB, gall bladder; PC, pericardium; UB, urinary bladder; DP, diaphragm.

manageable set known as the basic pulse or the eight important pulses, also referred to as the eight major pulses.

Sometimes, there are 6 or 8 basic pulses, which include floating, sunken (deep), slow, fast, slippery, rough, weak, and powerful pulses. By intensively practicing these 8 pulses and expanding upon them, learners of pulse diagnosis may obtain a composite understanding of the basic pulses when learning additional ones.

On the other hand, the comparative pulse diagnosis method observes the strengths and weaknesses of pulses in a total of six areas, *cun*, *guan*, and *chi*, on both hands, before performing pulse diagnosis. This method, differing from traditional pulse diagnosis, was primarily developed in Japan for use in meridian therapy, a type of acupuncture treatment. Due to its ease of learning, it also spread to Korean domestic medicine practitioners who utilized the Saam acupuncture method during the late 1950s and early 1960s [11].

The Japanese principle of comparative pulse originates from the “Classic of Difficult Issues” and establishes four patterns. These patterns include liver deficiency, spleen deficiency, lung deficiency, and kidney deficiency, excluding the heart. Historically, the heart has been considered the primary organ, whose failure can lead to death; therefore, the pattern of heart failure is not included [12].

In the pattern of liver deficiency, it is believed that the kidney, corresponding to the liver’s mother, is weak. There is a logical aspect in the treatment method for liver deficiency, as it employs the principle of treating the liver’s mother organ. Therefore, a weak pulse is observed in both the liver and kidney areas. The lungs, which control the liver, become stronger, and since the liver’s control is weakened, the spleen becomes slightly stronger.

In the spleen deficiency pattern, the heart, which corresponds to the spleen’s mother, is thought to be weak. This results in a weak pulse in both the spleen and heart areas. Consequently, the liver, which controls the spleen, becomes stronger, leading to a decrease in the spleen’s control. This imbalance causes the kidneys to become slightly stronger.

The lung deficiency pattern is characterized by a weak pulse in the lung and spleen areas, stemming from the concept that the spleen, which supports the lungs, is weak. As the heart, which governs the lungs, becomes stronger, the control over the lungs weakens, and the liver slightly strengthens.

The kidney deficiency pattern suggests that when the lung, which is considered the mother of the kidney, becomes weak, a

weak pulse appears in both the kidney and lung. As a result, the spleen, which controls the kidney, becomes stronger, while the kidney’s control weakens, leading to a slight strengthening of the heart.

If not just one viscus is weak, but multiple viscera are weak, a diagnosis of the bowel is made by observing the pulse at the position of the superficial area across six divisions.

Since yin and yang are contradictory properties, for example, in a liver deficiency pattern, if the liver is deficient, then the mother organ, the kidney, is also deficient. In other words, if the liver and kidney are weak, the corresponding organs, the gallbladder and bladder, exhibit a strong pulse. Furthermore, when the liver and kidney are weak, the organs that overcome them, namely the lungs and spleen, are strong. As a result of the strong lungs and spleen, the weak pulse in the areas of the large intestine and stomach can be explained [12].

In actual clinical practice, within the liver deficiency pattern, not only are the liver and kidney regions considered weak, but it is also important to note that a weak liver region does not necessarily imply weakness in the kidney region.

5. 1-cell method, 3-cell method, and 5-cell method

1) 1-cell method

This is a method of marking a total of six areas, including the *cun*, *guan*, and *chi*, on both wrists to assess strength and weakness. Clinical professionals can only check a circle in each box or use different notation symbols to indicate the size of the pulse from strong to weak, such as ⊙, ○, and o. The second circle indicates that the pulse’s strength is normal (medium), the overlapping circles signify that the pulse’s power is greater than medium, and the third, smaller circle denotes that the pulse’s power is less than medium. Table 2 illustrates an example of a liver deficiency pattern (Table 2).

2) 3-cell method

This method involves mapping the areas where the pulse can

Table 2. Liver deficiency pattern using 1-cell method

	Rt	Lt
<i>Cun</i>	⊙	○
<i>Guan</i>	⊙	o
<i>Chi</i>	○	o

⊙, bigger than normal pulse power; ○, as the same as the normal pulse power; o, smaller than normal pulse power.

be easily detected, considering the pulse’s depth—categorized as superficial, middle, and deep—across the six regions of *cun*, *guan*, and *chi*. Table 3 presents an example of the liver deficiency pattern (Table 3).

3) 5-cell method

This method marks the area where the pulse’s size can be easily felt, considering the five layers of each region for each of the six regions of *cun*, *guan*, and *chi*. The basis for the concept of the “Classic of Difficult Issues” is that with one finger, clinical professionals can check the condition of the lungs from the shallowest part, then the heart from a deeper part, followed by the spleen, liver, and kidneys. In a situation where the viscera have already been allocated to six areas on both wrists, measuring the five viscera again in each area seems redundant. However, it is meaningful to divide it into five layers and identify the part where the pulse is most palpable. Table 4 shows an example of the liver deficiency pattern (Table 4).

and pulse diagnostic instruments. It is important when using a tongue or pulse diagnostic device that it is connected to Korean medical dialectics or clinically based diagnoses. For example, simply showing the color of the tongue diagnosis as an RGB or lab value is meaningless unless it is connected to clinical data to enable a Korean medicine diagnosis. In the case of a pulse diagnosis device, it can display the pulse waveform and identify or interpret the corresponding pulse among the 28 Korean medicine pulse patterns.

In routine Korean medicine practice, medical doctors perform numerous physical examinations. In particular, manual pulse examination is challenging because, despite its accessibility, no method for objectification has been provided.

The difficulty of pulse diagnosis can be explained in two ways. First, it involves the subjectivity of the doctor having to feel it with their fingertips. Second, it requires the doctor to choose one out of 28 possible pulses to match the patient’s pulse image [9].

One of the simpler methods is comparative pulse diagnosis, which considers the allocation of the viscera. Comparative pulse diagnosis involves checking and comparing the sizes of pulses in the *cun*, *guan*, and *chi* regions on both wrists. For acupuncture treatment, clinical professionals can identify patterns of liver, spleen, lung, and kidney deficiencies.

In the main text, three methods are presented. The first method involves drawing a picture by assigning one cell to each of the six parts, resulting in a total of six cells. This method is

RESULTS AND DISCUSSION

The diagnostic methods of Korean medicine consist of inspection, listening and smelling, inquiry, and palpation. Among them, pulse diagnosis is unique compared to Western medicine and is still used in daily clinical practice. With the advancement of science and equipment, attempts are being made to conduct medical examinations using modern equipment, such as tongue

Table 3. Liver deficiency pattern using 3-cell method

	Rt			Lt		
	<i>Cun</i>	<i>Guan</i>	<i>Chi</i>	<i>Cun</i>	<i>Guan</i>	<i>Chi</i>
Superficial						
Middle						
Deep						

The area colored in gray is the area where the pulse can be felt.

Table 4. Liver deficiency pattern using 5-cell method

	Rt			Lt		
	<i>Cun</i>	<i>Guan</i>	<i>Chi</i>	<i>Cun</i>	<i>Guan</i>	<i>Chi</i>
Superficial						
Middle-superficial						
Middle						
Middle-deep						
Deep						

The area colored in gray is the area where the pulse can be felt.

used to illustrate the size of the pulse felt at the *cun*, *guan*, and *chi* positions on both wrists. If the intensity of the pulse power is indicated with symbols such as ⊙, ○, and ◦, it can be assessed more precisely.

In the 1-cell method, there is only one cell, so shapes such as ⊙, ○, and ◦ are used to record the power of the pulse. In the 3-cell method and 5-cell method, the cells (layers) are divided, and the cells that can be felt are colored in gray.

In step 2, clinical professionals should draw a diagram with three cells under each of the six parts, place them at three depths (superficial, middle, and deep), and indicate where doctors can most effectively feel the pulse.

The third step that clinical professionals can try is to use the 5-cell method, especially when doctors have heightened sensitivity in their fingertips. This method involves drawing five cells below the six parts and marking the area where the pulse can be easily detected. It is useful when greater precision is required compared to the 3-cell method.

From a Korean medicine perspective, comparative pulse diagnosis is a method that involves assessing the viscera by comparing the magnitude of pulse power, which is simpler than pulse image diagnosis. However, familiarity with the basic, wrist, and arm postures of both the patient and doctor during pulse examination is required. Subsequently, the left and right pulses are observed simultaneously to determine whether the left pulse, the right pulse, or specific sections of the *cun*, *guan*, and *chi* are stronger. This method could be particularly suitable for undergraduate students or inexperienced Korean doctors to identify weak pulse areas in patients. To perform comparative pulse diagnosis, the intensity can simply be displayed using the 1-cell method. However, for a more precise expression of strength, the 3-cell method or 5-cell method can be implemented.

Based on this, performing an examination of the pulse or observing various pulse patterns in each area will help improve accurate diagnosis and treatment rates.

In this study, the 1-cell method, 3-cell method, and 5-cell method were presented as methods to record and evaluate pulse objectively. Upon examining the 3-cell method with fourth-year Korean medicine students during a clinical practice class, the results indicated a very high agreement rate in pulse diagnosis [13]. Furthermore, this study introduced the 1-cell method as the easiest and the 5-cell method as the most challenging and sensitive.

It is believed that through this process, objectification of

pulse diagnosis will be possible, serving as a basis for a type of calibration that quantifies pulse power.

CONCLUSION

Pulse diagnosis is one of the four methods used for diagnosing and treating diseases in Korean medicine. It involves diagnosing diseases by feeling the pulsation from the patient's wrist with the doctor's fingers. To objectify this process, the 1-cell method, 3-cell method, and 5-cell method can be applied, allowing for evaluation and quantification among colleagues. Through such training in pulse diagnosis, a more advanced and high-level technique can be achieved, contributing to an improvement in treatment outcomes in the future.

CONFLICT OF INTEREST

Jun-Sang Yu has been an editorial board member of Journal of Pharmacopuncture since 2020 but has no role in the decision to publish this article. No other potential conflicts of interest relevant to this article were reported.

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