



A study on consistency and accuracy of pulse diagnosis in Eight-Constitution Medicine

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SUMMARY

The aim of this study is to evaluate appraiser's consistency and accuracy about pulse diagnosis (PD) in discrimination of eight-constitutions using Gage R&R study. Cumulative numbers of PD for discrimination of eight constitutions of three appraisers' experience were 75,000 cases, 50,000 cases, 1,100 cases, respectively. Three Appraisers diagnosed subject's eight-constitutions by PD with blinded method. Gage R&R study was used to verify the results. In the measurements of consistency, appraiser B (agreement = 80%, Value of $k = 0.8276$) was very good, appraiser A (agreement = 70%, Value of $k = 0.7465$) was good, and appraiser C (agreement = 50%, Value of $k = 0.5365$) was moderate. In the measurements of accuracy, appraiser B (agreement = 70%, Value of $k = 0.6812$) was good, appraiser A (agreement = 60%, Value of $k = 0.6414$) was good, and appraiser C (agreement = 0%, Value of $k = -0.1000$) was poor. The results suggest that accuracy of discrimination of constitutions relatively depend on experience and number of cases of PD. Further large controlled study is needed to evaluate the accuracy of PD.

Key words: Constitution; Diagnosis; Pulse

INTRODUCTION

Eight-Constitution Medicine (ECM) is medicinal theory announced for the first time in 1st The International Congress of Acupuncture that is held at the Japan Tokyo (Kuon, 1965). It is one of constitutional medicine that divide a person by

eight constitutions that GeumYang (Pulmotonia), GeumEum (Colonotonia), SooYang (Renotonia), SooEum (Vesicotonia), TowYang (Pancreotonia), TowEum (Gastrotonia), MokYang (Hepatonia), and MokEum (Cholecystonia) (Kuon, 2003). Practitioners of ECM suggest that each eight constitutions different in outward appearance, personality, behavior, and pathophysiology of disease as well as medicine, food, and life style for treatment (Kuon, 1974; Kuon, 2003). Main therapeutic means in ECM are eight constitution-acupuncture (ECA) and diet and life adjustment method according to each eight constitutions, got

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into much interests about therapeutic effect than past in the Republic of Korea recently (Chae *et al.*, 2001; Kim *et al.*, 2003).

Precondition that must make clear for the first time in system of ECM discriminate eight constitutions correctly. Discrimination of eight constitutions were evaluated by outward appearance of body, features of face, personality, and nature of a disease etc. (Lee *et al.*, 2003; Lee *et al.*, 2005), but most important and main diagnosis method is pulse diagnosis (PD) that called Maekjin (Kuon, 2003). Because, special skill is required to understands unique PD of ECM. Result of PD can be subjective according to practitioners' skill degree. Therefore, there are some criticisms that objectivity of ECM's diagnosis is insufficient. Many of research about ECM have been tried including basis principle of ECA, effects of ECA, clinical characteristics of eight constitutions, and reliability of PD in ECM (Shin *et al.*, 2003; Lee *et al.*, 2005). But, evaluating PD's consistency and accuracy is not conducted yet (Yin *et al.*, 2007).

'Gage R&R study' is method to analyze accuracy of measurement system that unites repeatability and reproducibility (Landis and Koch, 1977; Barrentine, 1991). There were some studies that use 'Gage R&R study' about optimization of measurement diagnosis system in oriental medicine are reported like a study on the optimization of acupuncture-point measurement system or study for a significance of skin elasticity and muscle tone in obesity (Jin *et al.*, 2004). We hypnotized that accuracy of discrimination of constitutions becomes different much by experience and number of times of PD. Therefore, we used the 'Gage R&R study' to evaluate diagnostic consistency and accuracy of PD in ECM.

MATERIALS AND METHODS

Study subjects and appraisers

First, we chose the twenty one ECM practitioners that signed on written consent of study and completed questionnaire, and finally choose three

appraisers that coincide in hypothesis that accuracy of discrimination of constitutions becomes different much by experience and number of times of PD. Two appraiser of three were ECM practitioners that experience was rich, and remainder one was less experienced relatively. Ten subjects were selected that confirm same constitutions through PD at the same time finally by three expert appraisers that have more than 50000 of discrimination experience.

PD

The study was performed with randomized controlled blinded methods. In brief, three appraisers' eye was hid and prohibited conversation, and took part in an experiment of PD for discrimination of eight constitutions by random order. Appraiser measured 3 times to 10 subjects, all 30 times.

The PD of ECM

The PD of ECM is somewhat different from traditional PD, so called 'cunkou PD', in both position and method. The contact points on the radial artery are about 1 inch more proximal than those conventionally identified. Until pulsation does not run using 2, 3, 4th fingertip, find pulse running strongly first, and removing slowly in doctor's hand after oppress both radial artery. Patient's position must be supine position this necessarily, and patient's right pulse must catch as doctor's left hand, pulse of left as right hand of a doctor. Pulse characteristics of eight constitutions were as followed (Fig. 1). Pulmotonia; Patient's right pulse in doctor's 2nd (middle) finger, patient's left pulse is felt in doctor's 3rd finger (fourth finger). Colonotonia; Patient's right pulse in doctor's 1st (index) finger, patient's left pulse is felt in doctor's 3rd finger. Pancreotonia; Patient's right pulse in doctor's 2nd finger, patient's left pulse is felt in doctor's 1st finger. Gastrotonia; Patient's right pulse in doctor's 2nd finger, patient's left pulse is felt in doctor's 1st finger and 3rd finger. Hepatonia; All patients' right and left pulse is felt in doctor's

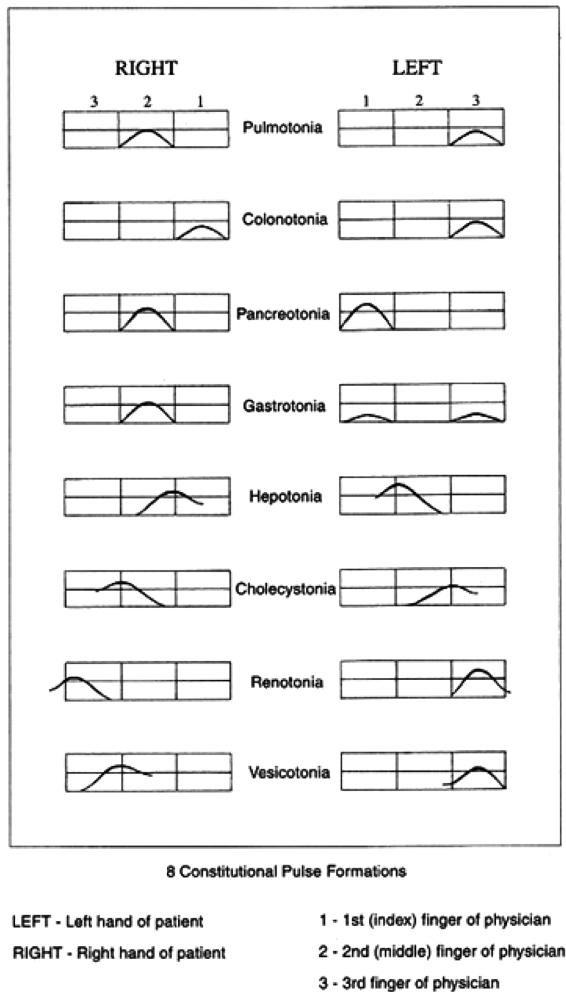


Fig. 1. Chart of Pulse Formations.

2nd finger but comes over some to 1st finger. Cholecystonia; All patients' right and left pulse is felt in doctor's 2nd finger but comes over some to 3rd finger. Renotonia; Patient's right pulse is felt in doctor's 3rd finger, but goes over some on fifth finger, patient's left pulse is felt in doctor's 3rd finger. Vesicotonia; Patient's right pulse is felt in doctor's 3rd finger but goes over some on 2nd finger, patient's left pulse is felt in doctor's 3rd finger.

Data Analysis

Analysis performed 'Gage R&R study' by MINITAB statistical software (ver. 13.20). Consistency of measured constitutions that appraisers' repeatability was

evaluated using 'Coefficient style Gage R&R study'. Compare each appraisers' measured constitutions and standard constitutions was evaluated by Kappa statistic. Also, appraisers' measured constitutions about subjects through 'Gage Run Chart' made plot, analyzed each appraisers' repeatability and differentia of reproducibility.

RESULTS

Characteristics appraisers and subjects

Average number of PD for discrimination of eight constitutions of three appraisers (appraiser a, b, c) was 45,300 and during average 9 years. Each PD number of times for discrimination of constitutions is 75,000 case, 50,000 case, 1,100 case, and career of ECM practitioners was each 12 years, 12 years, 3 years. Elect ten subjects' constitutions were two Pulmotonias, three Colonotonias, four Hepatonias, one Cholecystonia finally.

Consistency and accuracy of measured constitution

In appraiser A, the agreement rate of consistency of the diagnosed constitution was 70%, and Kappa statistic was 0.7465, and the agreement rate of appraiser B was 80%, and Kappa statistic was 0.8276, and the agreement rate of appraiser C was 50%, and Kappa statistic was 0.5365 (Table 1 and 2, Fig. 1(1)). Combined in these result, appraiser B was very good, appraiser A was good, appraiser C was moderate. Appraiser B showed the most superior in consistency.

Accuracy that compare each appraisers' measured constitution with the verified constitution already,

Table 1. Assessment agreement within appraiser

Appraiser	Inspected	Matched	Percent (%)	95.0% CI
A	10	7	70.0	(34.8, 93.3)
B	10	8	80.0	(44.4, 97.5)
C	10	5	50.0	(18.7, 81.3)

Matched, appraiser's assessment across trials agrees with standard.

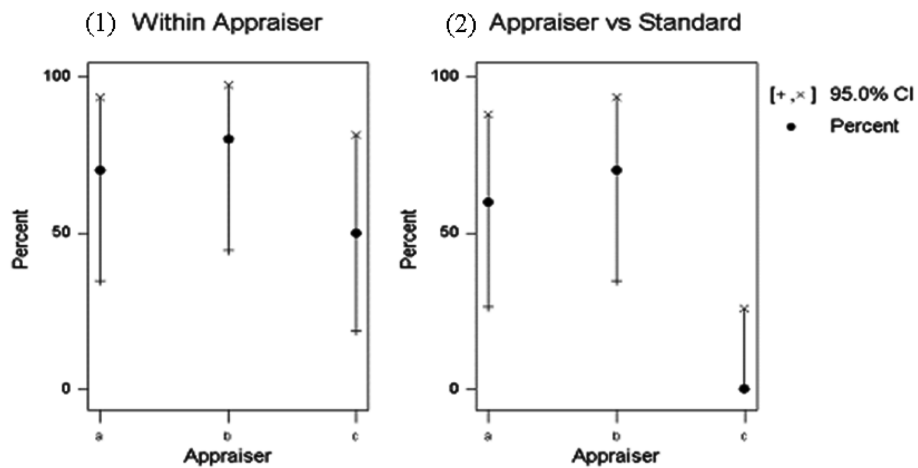


Fig. 2. Assessment agreement.

Table 2. Kappa statistics within appraiser

Appraiser	Measurement	Kappa	SE Kappa	Z	P (vs > 0)
A	Overall	0.7465	0.0857	8.7139	0.000
B	Overall	0.8276	0.0961	8.6141	0.000
C	Overall	0.5365	0.0839	6.3968	0.000

agreement rate of appraiser A was 60%, Kappa statistic was 0.6414 and the agreement rate of appraiser B was 70%, Kappa statistic was 0.6812, the agreement rate of appraiser C agreement rate was 0%, Kappa statistic was -0.1000 (Table 3 and 4, Fig. 1(2)). Therefore, appraiser B and A were good, appraiser C was very poorly evaluated.

Table 3. Assessment agreement between each appraiser and standard

Appraiser	Inspected	Matched	Percent (%)	95.0% CI
A	10	6	60.0	(26.2, 87.8)
B	10	7	70.0	(34.8, 93.3)
C	10	0	0.0	(0.0, 25.9)

Matched, appraiser’s assessment across trials agrees with standard.

Analysis of repeatability and reproducibility

We analyzed repeatability that investigate whether appraiser measured same constitution on equal subject and reproducibility that investigate whether same result of constitution between appraisers to equal subject by using Gage Run Chart.

In subject 1, repeatability was high with appraiser B and C, and reproducibility are high with appraiser A and B. In subject 2, repeatability was high with appraiser A, B and C, and reproducibility was high with appraiser A and B. In subject 3, repeatability is high with appraiser B and C, and reproducibility was high with appraiser A and C. In subject 4, repeatability was high with appraiser A, B and C, and reproducibility was high with appraiser A and B. In subject 5, repeatability was high with appraiser A

Table 4. Kappa statistics between each appraiser and standard

Appraiser	Measurement	Kappa	SE Kappa	Z	P (vs > 0)
A	Overall	0.6414	0.0983	6.5247	0.000
B	Overall	0.6812	0.1042	6.535	0.000
C	Overall	-0.1000	0.0826	-1.2108	0.887

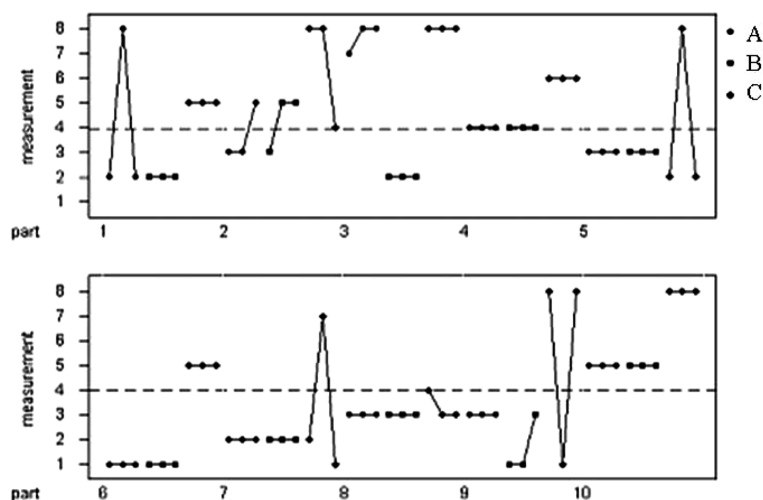


Fig. 3. Runchart of measurement by part, appraiser. Measurement 1, Pulmotonia; 2, Colonotonia; 3, Hepatonia; 4, Cholecystonia; 5, Pancreotonia; 6, Gastrotonia; 7, Renotonia; 8, Vesicotonia.

and C, and reproducibility was high with appraiser A and B. In subject 6, repeatability was high with appraiser A, B and C, and reproducibility was high with appraiser A and B. In subject 7, repeatability is high with appraiser A and B, and reproducibility was high with appraiser A and B. In subject 8, repeatability was high with appraiser A and B, and reproducibility was high with appraiser A, B, and C. In subject 9, repeatability was high with appraiser A, and reproducibility was no high with all appraisers. In subject 2, repeatability was high with appraiser A, B and C, and reproducibility was high with appraiser A and B (Fig. 3).

Combined in these result, appraiser B was most good at repeatability and reproducibility, and appraiser A is good next. Appraiser C was good at repeatability but reproducibility was bad.

DISCUSSION

The aims of in this study is to defined the diagnostic consistency and accuracy of PD in ECM by use of the 'Gage R&R study'. We fined that more experienced appraisers were superior in consistency and accuracy.

The concept of eight constitutions of ECM was based on peculiar schematic concept that classify

by different 8 conditions according to strength and weakness of internal organs that is congenitally obtained. Appearance, personality, various kinds characteristic such as behavioral and food are different according to eight constitutions. In ECM, organ imbalance that is born naturally called 'physiological imbalance', and imbalance of disease states called 'excessive imbalance'. ECA is therapeutic means to change pathologic status to physiologic status with balance that based on concept of correspondence of organ with acupunctural meridian (Kuon, 1974; Kuon, 2003). Eight constitutions can be discriminated by outward appearance of body, features of face, personality, and nature of a disease etc., but most important and main diagnosis method is PD (Kuon, 1973).

There were two reports about reliability of PD that performed not for constitutionally-verified subjects but for ordinary people were insufficient estimating reliability correctly. Because appraiser's agreement is very high (agreement = 83%, 89%), but agreement degree between appraisers was low (κ Value = 0.232).

There were some limitations of in this presented study. First, in case appraiser is 3 people in 'Coefficient style Gage R&R study' analysis (Hradesky, 1995)

required smallest 12 subjects, smallest repeat measurement number of times gets into 3 times. But appraiser measured 3 times to 10 subjects to prevent appraiser's fatigue in this study, measurement number of times is lacking than standard.

In this presented study, we also suggested that estimate appraiser's eight constitutions discriminations ability, 'Coefficient style Gage R&R study' method may be useful. Further study may be needed for finding method that is more objective and evaluate definitely consistency and accuracy about PD for discrimination of eight constitutions.

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