Contents lists available at ScienceDirect

European Journal of Integrative Medicine

Development of decision-making rules for pattern identification☆

Jae Chul Lee, Siwoo Lee, Hee-Jeong Jin*

KM Health Technology Research Group, Korea Institute of Oriental Medicine, 1672 Yuseongdae-ro, Yuseong-gu, Daejeon, Korea, Republic of Korea

ABSTRACT

Introduction: Pattern identification (PI) is the core concept of diagnosis in traditional East-Asian medicine. PI plays a role in the selection of treatment methods such as herbal prescriptions, acupuncture, or others. However, despite its importance, the standardization of PI has not been well studied. Here, we developed a decision-making system for PI using symptoms described by patients.

Methods: To construct a list of symptoms for each pattern, we reviewed the literature and conducted a series of surveys with a committee of experts. Eleven experts, who were practitioners with more than 5 years of clinical experience, participated in this study. Focusing on diagnosis indices for PI, we used a pairwise comparison model to obtain weight of each symptom in relation to each pattern. To assess the consistency of pairwise comparisons, we calculated the consistency ratio of each pattern.

Results: Eleven patterns were selected by the committee of experts; these patterns included "cold" (13 symptoms), "heat" (12 symptoms), "deficiency" (eight symptoms), "excess" (six symptoms), "qi deficiency" (six symptoms), "qi stagnation" (10 symptoms), "blood deficiency" (nine symptoms), "blood stasis" (15 symptoms), "phlegm" (14 symptoms), "kidney yang deficiency" (10 symptoms), and "kidney yin deficiency" (six symptoms). Pairwise comparison consistency was maintained (consistency ratios < 0.01).

Conclusions: We developed PI decision-making rules from the weight of PI indices. This study could contribute to simplify the PI process. In addition, it could help estimate the probability of diagnosing proper PI.

1. Introduction

Pattern identification (PI) has been used as an essential diagnostic tool and base in the selection of treatment methods in traditional East-Asian medicine [1–4]. Generally, experts diagnose PI through evaluating the physiological and pathological symptoms and disease characteristics using auscultation/olfaction, inquiry, and palpation. For example, using PI in a menopausal woman with hot flashes and recurrent headaches, we can decide in which points to perform acupuncture [5,6] according to the PI. PI consists of objective signs assessed by physicians as well as subjective symptoms referred by patients. For example, symptoms of patients with "cold pattern" include preference for warm temperature, cold hands and feet, dread of cold, bent body during sleep, hypothermia, paleness, diarrhea, peripheral chill, and

spasms [7]. Whereas, heat-related symptoms include diaphoresis, rapid pulse, constipation, thirst, and deep-colored urine [1].

However, despite its importance, PI has not been well standardized because of subjective inspection methods, which create difficulties for quantifying the status of patients. Of the four diagnostic methods, "inquiring" produces more difficulty for standardization. This is because experience and questioning skills of a practitioner may add subjectivity when performing PI. Research has been performed in order to quantify the value of qualitative evaluation for PI, using pulse [8], voice [9], body shape information [10], and whole human information [11]. Kim [8] suggested a classification method for deficient and excess pulse qualities (DEPs) based on quantification of pulse diagnosis. Lee [9] developed Body mass index (BMI) diagnosis tools (normal, overweight, and obese classes) for real-time monitoring by a logistic regression algorithm and two ensemble classification algorithms. Jang [10] developed the Sasang constitutional diagnosis tool based on body shape information. To diagnose PI, Ryu [12], Park [13], and Kang [14] developed PI questionnaires. Ryu [12] developed and evaluated a questionnaire for cold and heat pathology PI, and Park [13] examined the reliability and validity of the Phlegm Pattern Questionnaire (PPQ). Kang [14] examined

the reliability and validity of the Korean Standard Pattern Identification for Stroke (K-SPI-Stroke). These studies used statistical methods to fit the data for the tested subjects.

In this study, we developed a decision-making system for objective PI using pairwise comparisons to determine the symptoms involved in each PI. While, most of the previous
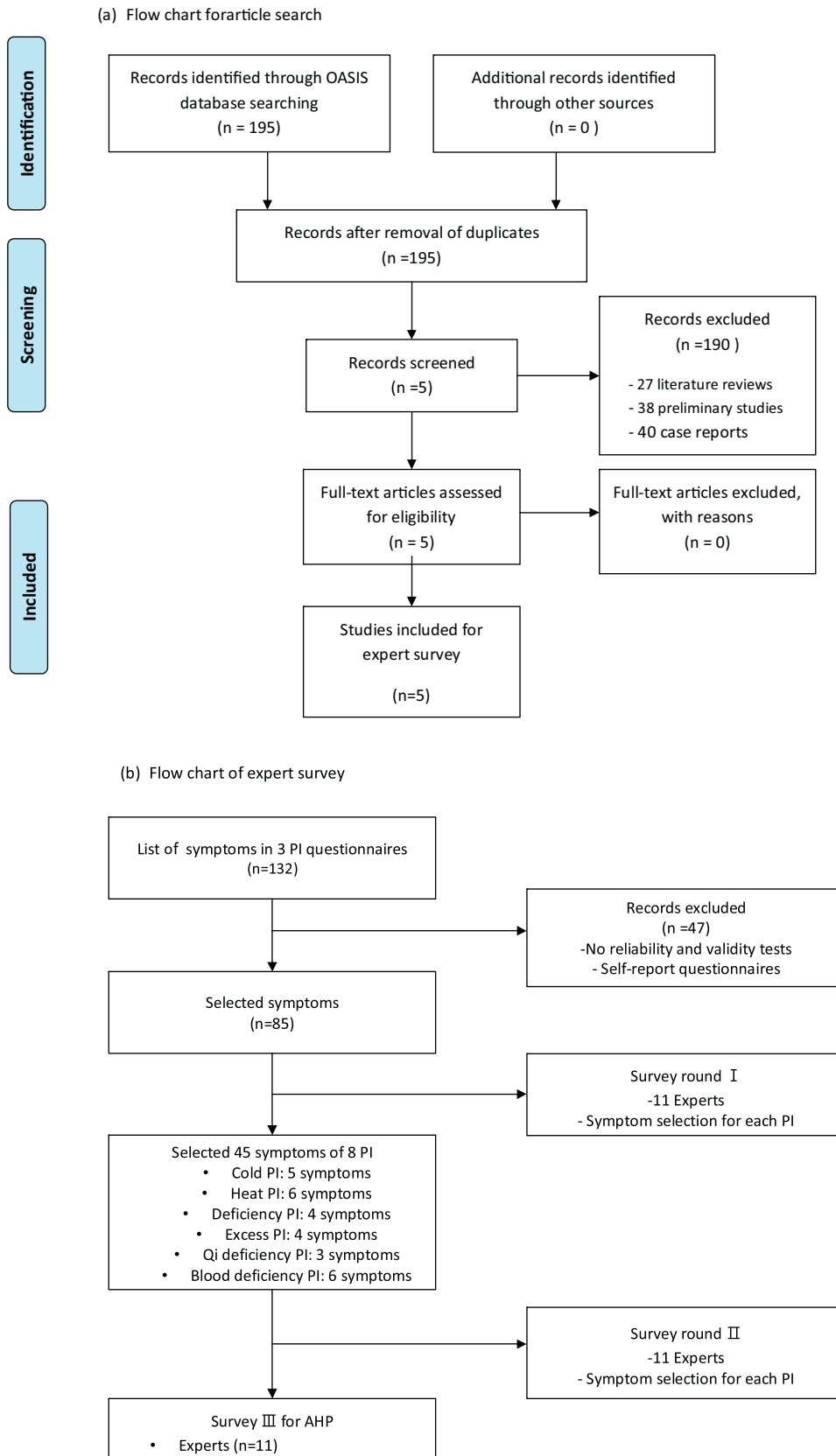
(a) Flow chart for article search

(b) Flow chart of expert survey

Fig. 1. (a) Flow chart for article search; (b) flow chart of expert survey.