



Inter-expert agreement and similarity analysis of traditional diagnoses and acupuncture prescriptions in textbook- and pragmatic-based practices



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ABSTRACT

This study examined (1) the agreement of acupuncture experts with textbook prescriptions and among themselves, and (2) the association between similar traditional diagnoses and textbook acupuncture prescriptions, examining whether pragmatic practice (i.e., modifying prescriptions according to personal clinical practice) alters such an association. A computational analysis quantified the diagnosis-prescription association from a textbook. Eight acupuncture experts were independently interviewed. Experts modified the textbook prescriptions according to their pragmatic practice. Experts mostly agreed (19–90%) or strongly agreed (0–29%) with the textbook prescriptions, with no-better-than-chance agreement on their ratings (Light's $\kappa = 0.036$, $CI_{95\%} = [0.003; 0.081]$). The number of manifestations in traditional diagnoses weakly explains the variability (Spearman's $\rho = 0.260$, $p = 0.038$) of the number of acupoints in prescriptions. The association between similar traditional diagnoses and acupuncture prescriptions is strong in the textbook ($\gamma = 0.720$, $CI_{95\%} = [0.658, 0.783]$), whereas pragmatic practice had little effect on this association ($\gamma = 0.724$ – 0.769).

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1. Introduction

Chinese Medicine is a traditional system developed for promoting wellness and restoring health [1]. Therapeutic interventions in Chinese medicine comprise acupuncture and alias techniques, herbal-food prescriptions, and mind-body exercises as single or bundle interventions [1]. Acupuncture is among the most commonly used Chinese medicine interventions for primary, secondary or tertiary prevention [2] and appears as a cost-effective intervention [3] for some conditions. Since its dawn in ancient China, acupuncture has faced periods of limited practice, abolition, prohibited practice, and reinvention worldwide [4]. A critical analysis [5] of systematic reviews on acupuncture found conclusions ranging from “optimistic enthusiasm to reserved skepticism”, and its mechanisms, as well as clinical effectiveness, still warrant elucidation [6].

Acupuncture stimulates skin loci – the acupoints – widespread in the human body. Acupoints are combined according to systematic-philosophic rules that define traditional diagnoses as clusters of clinical manifestations [7]. For instance, the traditional diagnosis Heart-*Yang* collapse includes clinical manifestations such as cyanosis of the lips, coma, frequent palpitation, and knotted pulse, whereas a patient with Liver-*Yang* rising can be presented with a red face and irritability [8]. Acupuncture prescriptions reported in textbooks [8] are taught for traditional diagnoses and are used to treat biomedical diagnoses as well [9]. Those textbook prescriptions are modified by acupuncture experts by including or excluding acupoints according to their usual practice [10,11]. Such pragmatism is clinically acceptable [12] but scientifically controversial [13], as it inputs variability into the original prescription and might explain the poor inter-expert agreement for acupuncture prescriptions [14].

Studies on contemporary literature of Chinese medicine are scarce but necessary for educational and practical purposes. For instance, an analysis of traditional diagnosis in a textbook revealed that the similarity between traditional diagnoses explains the misdiagnosis and no-diagnosis rates [15]. Additionally, an analysis of traditional therapeutic actions of acupoints showed that the

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similarities between acupoints are associated with their dermatome innervation [16]. Nonetheless, the extent to which similar clinical manifestations are treated by likewise similar acupuncture prescriptions remains systematically uninvestigated. Most importantly, whether being pragmatic alters this textbook diagnoses-prescriptions relationship is also unknown. Therefore, the aims of this study are two-fold. First, we aim to report the agreement of acupuncture experts with a set of textbook prescriptions and among themselves. It was hypothesized that, all else being equal, experts would mostly agree with textbook prescriptions but would mostly disagree with each other due to personal knowledge and experience. Second, we aimed to quantify the association between similar traditional diagnoses and textbook acupuncture prescriptions, examining to what extent the pragmatic approach of acupuncture experts alters such an association. It was also hypothesized that the more alike two traditional diagnoses are, the more alike their acupuncture prescriptions would be, either as described in the textbook or modified by experts.

2. Methods

2.1. Study design and report

This analytical study was conducted using a computational analysis of acupuncture prescriptions in a textbook and in interviews of acupuncture experts. The revised Standard for Reporting Interventions in Controlled Trials of Acupuncture [17] and Guidelines for Reporting Reliability and Agreement Studies [18] were followed if applicable to this study design. Acupoints were described according to World Health Organization [19,20] conventions.

A sample size calculation showed that a minimum of 2 acupuncture experts would be required to observe a fair to good agreement ($\kappa = 0.205$, $CI_{95\%} = [0.01; 0.40]$), considering 69 traditional diagnoses with a 5-item Likert question each (all equal probabilities of answers).

2.2. Ethics statement

The Committee on Research Ethics of the Centro Universitário Augusto Motta approved this study before its execution (protocol No. 64798717.0.0000.5235). Participants gave their written informed consent after being verbally instructed about the study aims and procedures.

2.3. Participants

A nonprobabilistic sample of eight acupuncture experts (36–59 years) was independently assessed in a single interview session (Supplementary file 1). Experts had attained a bachelor degree (seven physiotherapists, one physician) and had a full course of training in acupuncture (not less than 360 h of theoretic aspects plus 800 h of supervised clinical practice). They used acupuncture in their practices for 8–30 years in a private clinical setting and currently work either as a professor or supervisor in clinic-schools of acupuncture in Rio de Janeiro (RJ, Brazil).

2.4. Datasets of textbook traditional diagnoses and acupuncture prescriptions

Two datasets obtained from the same textbook [8] were edited to allow a full match between datasets. The textbook [8] was selected because (i) the traditional diagnoses and acupuncture prescriptions are presented in an organized fashion, thus allowing a systematic tabulation of data, and (ii) it is widely used as a

bibliographic source in specialization courses in Brazil and possibly worldwide, increasing the generalization of our findings to other experts. Information on dataset #1 comprised (Supplementary file 2) a traditional diagnosis label, clinical manifestations for inspection, auscultation-olfaction, interrogation, and palpation. Acupuncture prescriptions for those diagnoses were typed into the dataset. Alternative prescriptions explicitly provided as such were not included, whereas extra-channel acupoints were entered as separate variables but not used. Information about the 361 channel acupoints from dataset #2 comprised (Supplementary file 3) acupoint name and acupuncture numbering in the channel.

2.5. Interviews with acupuncture experts

Experts independently filled in a self-administered printed questionnaire containing all the traditional diagnoses, clinical manifestations, and respective acupuncture prescriptions in both datasets (Supplementary file 4). Each expert received the list in a unique random order, which was reordered before analysis for consistency, and the assessments were executed. First, they were asked to rate their agreement with the textbook prescription using a 5-item Likert question. Second, they were asked to pragmatically exclude or include acupoints, if any, for each prescription according to their usual practice [10,11] and regardless of the details of needling (depth of insertion, response sought, needle stimulation/retention time/type) or the treatment regimen (number of sessions, frequency/duration of sessions).

2.6. Computation of co-occurrence and similarity analysis of traditional diagnoses and acupuncture prescriptions

Two traditional diagnoses might share clinical manifestations, and two acupuncture prescriptions might share the same acupoints. Herein, 'dual diagnoses' refers to a set of two traditional diagnoses, e.g., Liver-Yin deficiency and Lung-Qi deficiency. Likewise, 'dual prescriptions' refers to a set of two acupuncture prescriptions, e.g., ST-36 and GB-34. To simplify this terminology, dual terms are denoted by * as in Liver-Yin deficiency*Lung-Qi deficiency or ST-36*GB-34. Such duals allow the quantification of the shared information between those duals regarding clinical manifestations and acupoints. Therefore, the Jaccard's similarity coefficient J was computed as a measure of co-occurrence of terms to quantify similarities between dual traditional diagnoses (based on shared clinical manifestations) and acupuncture prescriptions (based on shared acupoints). Coefficient J indicates the strength of similarity between dual terms of the same nominal variable and ranges from perfect dissimilarity (no shared terms, $J = 0$) to perfect similarity (all terms shared, $J = 1$).

2.7. Statistical analysis

Computational models were developed and implemented in R 3.3.3 and are available (Supplementary file 5). Statistical significance was set at $p < 0.05$.

Descriptive analysis of variables included mean (SD), median [minimum; maximum] and absolute and relative frequency (%). Histograms were generated to represent empirical distributions, whereas a scatterplot was generated to represent correlation analysis. The Spearman's ρ correlation coefficient estimated the strength of correlation between the number of clinical manifestations in all traditional diagnoses and the number of acupoints in the respective prescriptions. Similarity matrices representing the value of Jaccard's coefficient J (range 0–1) between dual traditional diagnoses and acupuncture prescriptions were generated independently for visualization and subsequent cross-tabulation.

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