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Evaluation of digit ratio and its symmetry in association with temperament in Persian medicine

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ABSTRACT

Background and Objective: One of the essential concepts of the Persian medicine (PM) is temperament (mizaj), which have a special contribution in health maintenance. In the present study we aimed to investigate the association of the hand digit ratio with the temperament types and the symmetry of this ratio between the two hands in each group to see whether these properties have a potency to be applied as an index for mizaj identification.

Methods: The study sample included 323 women aged between 20 to 32 years old. In order to obtain 2D:4D ratio, both hands were photographed from the palm side and then the length of index and ring fingers were measured using image J. Participants' temperament type was identified using a standard self-reported questioner.

Findings: In respect of the digit ratio, there was no significant difference between the study groups neither in right nor in left hands (kruskal wallis test for right hand: chi-square=3.985, df=8 p=0.858; for left hand: chi-square=4.311, df=8 p=0.828). However, the results of paired sample t-test showed a significant higher digit ratio in the right hand compared to the left hand in the cold-moist group (t=3.28, df=66, p=0.002).

Conclusion: The results of this study did not support the relationship between the digit ratio and temperament. However, individuals with cold-moist temperament showed asymmetry of the digit ratio. This finding suggests that the digit ratio asymmetry may has a potency to use as an index in the cold-moist mizaj identification.

Keywords: Temperament, Mizaj, Digit ratio, Symmetry pandemic era.

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Introduction

Traditional medicine (TM) is an important system of health care in many countries (1). One of the essential factors of this system is temperament, which is effectively applied in diseases cure. According to the PM, temperament is a homogenous quality results from the combination of four elements of earth, fire, air, and water with the natures of hot and wet, and cold and wet respectively, in the human body. In this context, if the temperament is regarded as the axes of two-dimensional spectrums of hotness and wetness, a lot of temperament types may be considered; but for simplicity, PM categorizes the temperaments into 9

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major groups including one temperate group; four simple groups (Cold, Warm, Dry, and Moist); and four combined groups (Warm-Dry, Warm-Moist, Cold-Dry, Cold-Moist) (2, 3). Now a large body of literatures support the hypothesis that the prenatal androgens affect the ratio of the index into the ring fingers length (2D:4D) (4). In the right hand, this ratio has been reported to be negatively associated to antenatal ratio of testosterone to estrogen; on other words, greater level of antenatal testosterone compares to estrogen bring children with lower ratio of 2D:4D (5). Digit ratio has been reported as a phenotype with ethnical and sexual dissimilarity (6) and suggested to be a putative biomarker by many recent studies (7). In PM, various indices such as touch and hair condition, skin color, physique, physical and psychic functions are applied to identify the type of the temperament (3, 8). For instance, some of morphological characteristics which regard to be related to the temperament are chest size, nose shape, and finger length and thickness (3). Considering the fact that morphological features of human individuals can be used as an indicative of their mizaj type, in this study we aimed to investigate the association of the hand digit ratio with the temperament types and the symmetry of this ratio between the two hands in each group to see whether these properties have a potency to be applied as an index for mizaj identification.

Materials and methods

This cross-sectional study included 323 Persian women, aged between 20 to 32 years old. All of the volunteers were single and from Fars province, south west of Iran. Participants who had any disease, alcohol or smoking habits, and being in menstruation were excluded from the study. Data gathering was done from October to December 2019 and the volunteers were participated in our previous studies too (9, 10). This study was authorized by Shiraz University ethics committee (ECBDE-SU-9-6177616), and oral informed consent was obtained from all volunteers. In order to measure the index and ring fingers length, the palm side of both hands were photographed using the same camera on the same magnification and from the same distance. The length of fingers (from the bottom line in finger's basal crease to the tip of the finger) were obtained on the hand photos using Image J software. The 2D:4D ratio was calculated by division of the index finger length into the ring finger length. Participants' temperament was identified using a standard self-reported twenty question scale, designed by Salmannegad et al. (11). Paired sample t-test, kruskal wallis and wilcoxon signed-rank tests were applied to determine whether there were any significant differences between the study groups. Data analysis was performed using the SPSS version 22 and a p-value less than 0.05 was assumed as significant level.

Results and discussion

The frequency and age mean of each temperament study group were presented in the Table 1. According to the data, the most frequent temperament types were cold-moist and warm-moist. In respect of age, the difference between the study groups was insignificant (kruskal wallis test: chi-square = 12.67, df=8 p=0.124). The 2D:4D value and index and ring fingers length means of the right and left hands in each temperament study group were presented in the Table 2. With reference to the digit ratio, there was no significant difference between the study groups neither in right nor in left hands (kruskal wallis test for right hand: chi-square = 3.985, df=8 p=0.858; for left hand: chi-square = 4.311, df=8 p=0.828). To asses if the two hands had symmetry in respect of the digit ratio, we compared the means of digit ratio between the right and left hands in each study group. The results of paired sample t-test showed a significant higher digit ratio in the right hand compared to the left hand in the cold-moist group (t=3.28, df=66, p=0.002). Other groups did not reveal any significant difference. We also compared the mean of each index and ring fingers length in the right hand to their equivalent in the left hand, and found that the length mean of index finger in the right hand was significantly higher than that in the left hand in the cold-moist group (t=-4.27,

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df=66, p=0.00006) while there was no any significant difference between the length means of the ring fingers (t=-1.02, df=66, p=0.313). Other groups showed no any significant difference neither in the index nor ring fingers, except for the warm-dry group which showed a borderline significant higher length mean of the index finger in the right hand compared to that in the left hand (t=-2.10, df=24, p=0.046).

In a previous study, we found that the coldness of temperament related to the greater depression and hopelessness scores in females (9). In the present study we examined if prenatal sex hormone levels, in term of hand digit ratio associated with the temperament. The data showed that the most frequent temperament types in the study sample were cold-moist and warm-moist. Previously, a report from the capital of Iran indicated that the most frequent mizaj in females was temperate (12). However, in that study, an alternate mizaj identification scale with somewhat different specificity and sensitivity from that of Salmannezhad scale was used. According to the data, there were no significant differences in the means of the hands 2D:4D ratio between the temperament study groups. Now there is a significant body of evidence suggesting that 2D:4D ratio associates with divers psychological, physiological, and pathological (7) features such as face shape (7), maxillary sinus volume (13), sperm number (14), age at menarche (15), osteoarthritis (16), lung cancer (17), etc. In this study, we did not detect any association between the digit ratio in either hand and the type of temperament, however we found that the digit ratio between two hands was asymmetric in the cold-moist temperament group. This asymmetry was found to be in result of unequal length of the index finger between the two hands. Although this inequality was detected in the individuals with warm-dry temperament too, but did not lead to the digit ratio asymmetry. Asymmetry is known to occur in the limb bones, as the left forearm and humerus may be shorter than the right. Besides associated with certain musculoskeletal pathologies, the limb asymmetry is suggested to arise spontaneously without any pathological reason too (18). The results of this study therefore suggest that the digit ratio asymmetry may has a potency to use as an index in mizaj identification. However, this is a preliminary study and there were two limitations which may affect the results. The first and main limitation is that the study suffered from small sample size. Second, we identified the temperament using a self-reported scale, and thus, a clinical diagnosis may also need to improve the reliability of the mizaj identification. Further inspections are required to declare whether overcoming these limitations change the association of temperament with 2D:4D ratio and its asymmetry.

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Table 1. The frequency and age mean of the temperament study groups

Temperament	N (%)	Age mean±SE
Temperate	20 (6.2)	22.6±0.48
Warm	25 (7.7)	24.2±0.65
Cold	44 (13.6)	22.6±0.40
Moist	21 (6.5)	22.1±0.48
Dry	18 (5.6)	23.6±0.66
Warm-Moist	65 (20.1)	22.8±0.32
Warm-Dry	25 (7.7)	23.2±0.53
Cold-Moist	67 (20.7)	23.3±0.31
Cold-Dry	38 (11.8)	22.6±0.41

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Table 2. The mean of digit ratio and fingers length in the temperament study groups

Temperament	R2D:4D	L2D:4D	R digit length		L digit length	
			2D	4D	2D	4D
Temperate	0.985±0.009	0.984±0.008	71.51±1.81	72.65±1.80	70.14±1.52	71.30±1.43
Warm	0.977±0.007	0.974±0.006	73.73±1.18	75.47±1.12	72.87±1.22	74.85±1.23
Cold	0.978±0.005	0.973±0.005	69.64±0.77	71.25±0.86	69.20±0.81	71.17±0.84
Moist	0.973±0.010	0.972±0.009	70.21±1.59	72.17±1.47	70.15±1.18	72.33±1.54
Dry	0.984±0.010	0.984±0.010	68.48±1.11	69.62±0.96	68.20±1.17	69.34±1.18
Warm-Moist	0.977±0.004	0.977±0.005	68.72±0.53	70.42±0.61	68.48±0.55	70.18±0.62
Warm-Dry	0.981±0.008	0.970±0.008	70.13±1.19♮	71.42±0.89	68.94±1.05	71.13±1.01
Cold-Moist	0.986±0.005*	0.969±0.005	70.47±0.75♯	71.54±0.74	69.01±0.75	71.28±0.80
Cold-Dry	0.978±0.006	0.976±0.007	70.57±0.85	72.30±1.04	70.01±0.86	71.89±1.05

Values were expressed as mean±SE

2D:4D, division of the index finger length into the ring finger length; 2D, index finger; 4D, ring finger; R, right hand; L, left hand

*P < 0.01 indicates significance level compared to the L2D:4D in the same group

♮P < 0.05, ♯P < 0.0001 indicate significance level compared to the

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Conflict of interest: None.

Author Contributions

Obtaining the data, statistical analyses, and drafting of the manuscript, Shabnam Aliabadi; Study design, statistical analyses, revising the manuscript and approving the final manuscript, Zahra Zendehboodi.

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