Original research

Heart rate and arterial blood pressure correlation with Iranian traditional medicine temperamental model

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Abstract:

Background: Although the temperament is one of the most important bases of the traditional medicine, it is always a challenging issue among the Hakims and philosophers. The present study aimed to determine the importance and validity of hemodynamic values in individual temperament.

Method: This cross-sectional study has been carried out on 20-25 years old students of Tehran University of Medical Sciences. Individual temperament was initially determined using a questionnaire in which qualitative criteria of temperament have been changed to quantitative scales and presented as temperament score. Then temperament correlation with arterial blood pressure, pulse pressure and heart rate was evaluated using correlation and multivariate linear regression tests.

Results: A hundred and two students (45.1% male) were enrolled. Multivariate linear regression adjusted for body mass index showed systolic blood pressure (β=0.95; t=9.7; p<0.001), diastolic blood pressure (β=0.99; t=8.26; p<0.001) and heart rate (β=0.88; t=6.2; p<0.001) were associated with temperament. In addition, temperament score was significantly higher in males (β=5.85; t=2.5; p<0.015) than females.

Conclusion: To the best of our knowledge, this study is the first one that evaluated the correlation of hemodynamic factors with temperament model of Persian traditional medicine. Our findings showed that gender, high systolic and diastolic blood pressure and fast heart rate were associated with temperament.

Keyword: Traditional Medicine; Temperament; Predictive Factors

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1. Introduction

Temperament is one of the most important factors in diagnosis and treatment of diseases in traditional medicine (1). It has a pivotal role in both health and treatment interventions; though its determination has always been challenging issues among philosophers. Therefore, with respect to the new approach to the traditional medicine, precise and reliable indices for temperament determination especially in traditional medicine research are needed (2, 3).

Traditional medicine practitioners use different methods to measure temperament among which individual history based on traditional medicine and ten temperament characteristics are highly important. These char-

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acteristics include touch status (skin temperature, delicacy and dryness), body stature (obesity, slimness), hair status, skin complexion, limb ratio, natures' effects (warmness, coldness, wetness and dryness), functions speed, waste materials, sleep and wakefulness rate and psychological and emotional status (1, 4). All these parameters are qualitative and cannot be used to precisely quantify warmness or coldness of temperament. Therefore, efforts should be made to quantify these parameters for having an exact individual temperament score.

In spite of recent medical improvements in diagnosis, follow-up and prevention of diseases and under the shadow of vast use of biochemical tests, tissue specific enzymes measuring and exact radiographic methods such as Doppler echocardiography and so on, physical assessments like blood pressure, pulse rate and pulse pressure are still among the accessible means of physicians upon the patients' first visit (5). Heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure and pulse pressure are factors showing healthy cardiovascular system (6). These hemodynamic parameters are easily measured and have quantified criteria. These characteristics make them useful for temperament determination. Therefore, in this study we tried to evaluate the importance and validity of these parameters in temperament determination.

2. Method

This is a cross-sectional study carried out on students stayed in dormitory of Tehran University of Medical Sciences and went on the same food regiment during January and February of 2011. This study was approved by institutional review board of Tehran University of Medical Sciences.

Samples were randomly assigned based on a computer based random number generator. Students with chronic diseases, long term drug use or drug use during the study course, constipation, flatulence or any other gastrointestinal disturbances were excluded. Moreover, volunteers should have an initial check-up to assure their health based on routine lab tests such as serum bilirubin, lipid profile, creatinine (Cr), blood urea nitrogen (BUN), fasting blood sugar (FBS) and complete blood count (CBC). In case of abnormal test results, the volunteers have been crossed out from the study. Fifteen milliliter fasting venous blood samples were drawn from 7:30 am up to 8:30 am during January and February to assess above mentioned tests. Ten hour fasting periods were followed before blood collection for each volunteer.

Heart rate was measured via radial pulse touch in a minute. Arterial pressure was also recorded by auscultatory method using a cuffed mercury sphygmomanometer fastened over the left humerus bone in supine position after a rest period of at least 15 min and reported in millimeter of mercury unit. Height was measured by digital height meter with a standard error of 0.1 cm while each volunteer stood upright with bare feet, straight knee and look straight ahead on a flat floor. Weight was also recorded with 500 g standard errors by digital weighing scales with removed excess clothing and shoes. Body mass index (BMI) was then calculated by BMI=Weight/Height2 formula.

Temperament score was determined using questionnaire designed by the study researchers based on traditional medicine references. Content validity was ratified by the instructors of School of Traditional Medicine. Initial questionnaire contained 51 questions regarding temperament measurement factors. After evaluation of questionnaire by expert panel, finally a 38-item questioner was designed. Reliability of the questionnaire was confirmed by calculating the alpha-Cronbach (alpha=0.77), based on pilot study. Each question was assigned a score of 1 to 7and a total score of 38 to 266. In this fashion, the score of 38 demonstrated the coldest possible temperament and 266 was the warmest one. In addition to temperament related questions, demographic data such as age, gender and ethnicity were also asked.

In this study, sample size calculation strategy was adapted from the temperament score and blood pressure correlation coefficient. In our pilot assessment, the least correlation coefficient belonged to the pulse pressure and was 0.42. So, to assess the significant difference of the coefficient with zero at confident interval of %95 (α=0.05) and the test power of %90 (β=0.10), suitable sample size of 90 was defined for the study.

All analyses were performed by SPSS 11.0. Pearson correlation test was used to assess relationship of temperament with age and hemodynamic factors. The effects of gender and ethnicity on temperament score were obtained using independent t test and one-way analysis of variance, respectively. To adjust analyses for confounding variables, partial correlation analysis was also done. Here, we found that blood pressure has correlated with body mass index. Therefore, BMI has been entered as a confounder in all analyses. A multivariate linear regression model was also adopted to determine independent correlation between temperament and studied variables. Significance level was defined at $p<0.05$.

3. Result

In this study, 102 students (45.1% male and 54.9% females) with the mean age of 22.5±1.7 were assessed. All

Table 1: Study samples demographic data

Variable	N (%)	Mean age	Temperament score
Gender			
Male	46 (45.1)	22.8±1.7	16.7±166.1
Female	56 (54.9)	22.1±1.7	15.4±6156
Ethnicity			
Fars	68 (66.7)	22.3±1.7	161.5±16.9
Turk	21 (20.6)	23.2±1.5	160.1±16.2
Kurd	11 (10.8)	22.2±1.6	160.6±19.4
Lur	2 (1.9)	22.5±1.7	161.0±16.8

Table 2: Arterial blood pressure and heart rate correlation with temperament score

Factor	Unadjusted r	p	Adjusted r	p
Heart rate	0.40	<0.0001	0.41	<0.0001
Systolic Blood Pressure	0.70	<0.0001	0.71	<0.0001
Diastolic Blood Pressure	0.52	<0.0001	0.56	<0.0001
Mean Arterial Pressure	0.64	<0.0001	0.67	<0.0001
Pulse Pressure	0.41	<0.0001	0.37	<0.0001

r: Correlation coefficient.

candidates were bachelor, healthy and nonsmoker with no history of chronic diseases or long term drug use (Table 1). Samples' temperament score ranges from 122 to 201 with the mean of 160.9±15.9.

Mean and standard deviation of the temperament score based on gender were 156.6±15.4 for females and 166.1±16.7 for males (p=0.004). Correlation test showed that ethnicity (p=0.8) and age (p=0.6) were not associated with temperament score, but gender (p=0.003) was significantly correlated. Therefore, gender as a confounder, entered the analyses. In addition, BMI was correlated with blood pressure (r=0.41, p=0.001). Gender and body mass index adjusted analyses showed that pulse rate (r=0.41, p<0.0001), blood pressure (r=0.71, p<0.0001), diastolic blood pressure (r=0.56, p<0.0001), mean arterial blood pressure (r=0.67, p<0.0001) and pulse pressure (r=0.37, p<0.0001) were significantly correlated with temperament.

Multivariate linear regression analysis controlled for BMI showed a positive relationship of systolic blood pressure (β=0.95; t=9.7; p<0.001), diastolic blood pressure (β=0.99; t=8.26; p<0.001) and pulse rate (β=0.88; t=6.2; p<0.001) with temperament. In addition, temperament score was significantly higher in males (β=5.85; t=2.5; p<0.015) than females (Table 3).

4. Discussion

This study showed that male gender, high systolic and diastolic blood pressure and fast heart rate were associated with warm temperament. Heart rate, systolic and diastolic blood pressure, mean arterial pressure and pulse pressure are cardiovascular health determining factors (6). Increased heart rate in persons with warm temperament implies their high metabolic rate or soared nutrients, more oxygen demands and body waste products. Accordingly, we can conclude that persons with warm temperament have higher bioactivity. Hence, their cardiac outputs are more than persons with cold temperament. High blood pressure can also be explained by high cardiac output (7). Therefore, faster heart rate can provide higher blood pressure.

It is noteworthy that, this study is the first to assess the correlation of hemodynamic factors with Iranian traditional medicine model. Therefore, any comparison with other studies was not possible. But, having looked at Cloninger temperament models (8-11). We can see that our study is fairly in agreement with previous studies. LeBlanc et al showed that heart rate in type A character class and extroverted people is higher than other character types (12). Still, Hintsanena et al showed that reward dependence and novelty seeking temperaments were directly associated with high systolic and diastolic blood pressure while harm avoidance temperament had inverse association with above-mentioned factors (13). Surprisingly, cold temperament is related to harm avoidance character while warm temperament is fairly correlated with novelty seeking and reward dependence characters (13).

However, Puttonen et al. based on the correlation of Cloninger temperament model with heart rate and vagus tone noted that when individual character tends to harm avoidance, the heart rate will increase (6). Therefore, available studies on heart rate and temperament

Table 3: Results of multivariate linear regression

Factor	Coefficient	P*
SBP	0.95	<0.001
DBP	0.99	<0.001
Heart rate	0.88	<0.001
Gender	5.85	0.015

*Adjusted for body mass index. DBP: Diastolic blood pressure; SBP: Systolic blood pressure.

correlation have controversial findings due to different samples or temperament models. Yet, all studies confirmed the relation of the temperament and blood pressure.

Temperament correlation with biologic systems has long been the focus of researchers' attention and still is an attracting issue (14). Most researchers believe that temperament has biological and genetic basis, though environmental factors and pubertal development can form it (15, 16). According to, Shahabi et al, mean norepinephrine/epinephrine ratio in warm temperament was significantly higher than cold temperament. This study also showed that the ratio would increase when the temperament leaned toward warm. Mean norepinephrine/cortisol ratio has also been reported to be higher in warm temperament than cold temperament. Interleukin 4 to Interferon-gamma ratio (IL-4/IFNγ) has been higher in warm temperament than cold temperament too. This ratio has been well correlated with warm to cold ratio in such a way that when temperament tends to change into very cold or very warm, this ratio will increase in both groups (2, 17). Increased norepinephrine level in warm temperament also confirms our findings since chronotropic, inotropic and hypertensive effects of norepinephrine have long been approved (18, 19).

Temperament as an individual factor has remarkable effects on human health. Unfortunately, recent two decades inattention to this important rule and setting aside traditional medicine made this vital rule of medicine which has been developed for decades by philosophers or Hakeems to be neglected and even forgotten.

Nevertheless, during the recent years researchers drew special attentions of medical and health professionals to temperament and led to daily boost of research in this field (15, 20-22). Still, there are controversies between Hakeems and scientists on temperament determination. Therefore, designing a strong base for the temperament determination should be the first research priority. If this comes true, the temperament and traditional medicine views will be outstandingly brilliant and the health and life expectancy of the human will remarkably be increased.

It's noteworthy that temperament in Iranian traditional medicine has two warm-cold and wet-hot axes. In this study which is the first on assessment of temperament correlation with aforementioned parameters, we've just evaluated the cold and warm temperaments for simplicity and minimizing the effects of confounding factors. Therefore, future studies are strongly recommended to link wet-dry axis with physiologic factors.

5. Conclusion:

This is an introductory study designed to assess the correlation of hemodynamic factors with temperament model of Iranian traditional medicine. Our findings showed that higher systolic and diastolic blood pressure and faster heart rate were associated with warm temperament. Our study also confirmed this rule of traditional medicine that men have warmer temperament than women.

6. Acknowledgment

None.

7. Conflict of interest

No conflict of interest was declared.

8. Funding source

None.

9. Author contribution

MK, MY and ME designed the study. MH analyzed the data. MY, ME and MC provided data collection. MY wrote the paper. All authors critically revised the manuscript and approved final version of the paper to be published. They agreed to be accountable for all aspects of the work.

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