Original Article
Health in traditional Chinese medicine and related factors in women of childbearing age

Qiaoyu Jiang[1,2], Jue Li[1,3], Guanghua Wang[3], Jing Wang[4]

[1]Department of Prevention, Tongji University School of Medicine, Shanghai City, China; [2]Department of Health Care Management, School of Public Health, Fujian Medical University, Fuzhou City, Fujian Province, China; [3]Shanghai First Maternity and Infant Hospital, Tongji University School of Medicine, Shanghai City, China; [4]Tongji Hospital Affiliated to Tongji University, Shanghai City, China

Abstract: Objective: To investigate the traditional Chinese medicine (TCM) constitution among women who planned to be pregnant in one year and explore factors associated with TCM constitution. Methods: The study was conducted among 708 women who participated in free preconception check-ups provided by the Zhabei District Maternity and Child Care Centre in Shanghai, China. The information regarding the female demographic characteristics, physical condition, history of pregnancy and childbearing, diet and behaviour, and social psychological factors was collected, and TCM constitution assessment was performed. The Chi-square test, t-test, logistic regression analysis, and multinomial logistic regression analysis were used to explore the related factors of TCM constitution. Results: Approximately fifty-five women in this study had unbalanced constitutions. The result of the logistic regression analysis showed that residence in Shanghai (AOR=1.732, P=0.003), gum bleeding (AOR=1.712, P=0.003), aversion to vegetables (AOR=3.051, P=0.023), job stress (AOR=2.278, P=0.000), and economic stress (AOR=1.561, P=0.008) were significantly and negatively associated with balanced constitution. The result of the multinomial logistic analysis showed that residence in Shanghai was significantly associated with Yang-deficiency Constitution (AOR=2.362, P=0.047), and Stagnant Qi Constitution (AOR=1.616, P=0.032); gum bleeding was significantly associated with Yin-deficiency (AOR=4.220, P=0.000), Stagnant Blood Constitution (AOR=1.750, P=0.048), Stagnant Qi Constitution (AOR=1.633, P=0.020), and Inherited Special Constitution (AOR=4.020, P=0.000); aversion to vegetables was significantly associated with Yang-deficiency (AOR=4.501, P=0.040) and Damp-heat Constitution (AOR=8.013, P=0.000); job stress was significantly associated with Yang-deficiency Constitution (AOR=3.852, P=0.000), Phlegm-dampness Constitution (AOR=6.130, P=0.045), Damp-heat Constitution (AOR=3.532, P=0.000), Stagnant Blood Constitution (AOR=2.513, P=0.000) and Stagnant Qi Constitution (AOR=1.901, P=0.003); and economic stress was significantly associated with Yang-deficiency Constitution (AOR=2.270, P=0.007), and Stagnant Qi Constitution (AOR=1.646, P=0.000). Conclusions: It is possible for women without medical conditions to have unbalanced constitutions. The related factors found in this study may provide some new insights for medical staff working on preconception care.

Keywords: Body constitution, Chinese traditional medicine, risk factors, preconception care, women

Introduction

The health of women in the childbearing age has been concerned for years. It has believed that prenatal care and neonatal care may be too late and ineffective to achieve primary prevention of many adverse birth outcomes [1-3]. Therefore, preconception care is suggested to be applied to increase the likelihood of a desired and healthy pregnancy and a healthy infant by providing timely and exact information and intervention [4, 5]. In modern medicine, women who do not have medical conditions are usually given similar guidance. However, with

the fast development of social economy and medical research, personalized health care has been gaining increasing popularity, so how to differentiate the women with similar condition is concerned.

The traditional Chinese medicine (TCM) constitution is a kind of explanatory model for understanding various aspects of life [6]. Constitution, which also named as *ti-zhi*, is a term that extensively used in TCM. Literally, *ti* refers to body and *zhi* means quality or substance. From the perspective of TCM, a person's constitution, which is partly acquired, can be improved by

taking herb medicine and adjusting diet and life-style [6, 7]. Since last century, Wang et al. began to study TCM constitution and developed the Constitution in Chinese Medicine Questionnaire (CCMQ) based on the TCM theory, multidisciplinary studies and clinical practice [8-10]. According to body shape, psychology and other characteristics, CCMQ classifies human constitution into nine types: one of them is called Balanced Constitution (normal constitution), and the other eight belong to unbalanced constitutions, which are called Qi-deficiency, Yang-deficiency, Yin-deficiency, Phlegm-dampness, Damp-heat, Stagnant Blood, Stagnant Qi and Inherited Special Constitutions. The person with unbalanced constitution can be viewed as having disharmony condition and is susceptible to specific disease or symptoms. Different constitutions show different characteristics. For example, people with yin-deficiency tend to have manifestations like thirst, constipation, insomnia, and dry eyes and skin; meanwhile, most of them appear to be skinny, experience frequent feverish sensations in the cheeks, soles and palms, and have aversions to summer heat.

In TCM, unbalanced constitution is considered as a specific etiological factor in many diseases. In cases where the pathogeny of a certain health problem stays unclear, constitution can be referred to for some instructive explanations. The theory of TCM constitution provides personalized services according to three aspects: firstly, women with similar demographic and medical characteristics have different constitutions [11]; secondly, different constitutions need different treatments, namely, women need different guidance on work, rest, exercise regimen, diet (due to different food properties) and different Chinese herb recipes; finally, foods that provide similar nutrients may have different TCM natures, so people should choose the foods in line with their constitutions [6, 7, 9].

According to TCM theory, gravidas with unbalanced constitutions may be at higher risk of uncomfortable symptoms and adverse outcomes due to the maladaption to the physiological and psychological changes brought about by pregnancy and delivery. Qi and Blood deficiency can impact the menstruation, pregnancy and childbearing, as well as influence both the health of mother and fetus or new-born [12, 13]. It was reported that a new-born whose parents suffer from asthma, or have an allergic constitution is at risk to develop bronchial asthma [14, 15]. Additionally, during the first trimester of pregnancy, other discomfort symptoms including frequency of urination, heavy vaginal discharge, fatigue, vomiting, nausea, nasal congestion, mood swings, dizziness, poor sleep, are all closely associated with TCM constitution, especially, breast tenderness is evidently and positively interrelated with the constitutions of Yin-Xu, Yang-Xu, and Tan-Shi-Yu-Zhi [16]. Therefore, identifying the TCM constitutions of women at the childbearing age may help doctors to better understand and find risk factors related to their uncomfortable and adverse pregnant outcomes.

As a complementary medicine, TCM, which includes diet, Chinese herbs, and acupuncture, has been widely used and has been demonstrated to be effective in disease prevention and treatment [17-20]. Therefore, it is feasible to integrate the TCM constitution theory into preconception care. Seeking further understanding and data on female health, this study investigated the constitution of women who want to be pregnant within one year, and explored associated factors of various TCM constitutions.

Methods

This cross-sectional study was conducted in the Zhabei District Maternity and Child Care Center in Shanghai, China. The Ethics Committee of Tongji University Medicine and Life Science Unit had approved this study (No.: 2013-yxy07), and written informed consents were obtained from all participants prior to the study.

Participants

A total of 724 women who received preconception health check-ups in our hospital from May 2013 to December 2013 were invited to participate in this study. All women were asked to complete a basic information questionnaire and their TCM constitutions were assessed by same group of herbalist doctors. All questionnaires were answered with real names so that the participants could be followed up for counselling at a later time. Each individual had the

right to join or drop out at any time in the process of the study. Among them, 16 cases (2.2%) were removed from the analysis as the information they gave were incomplete (eight cases with incomplete information on the CCMQ and eight cases with incomplete data on the basic information questionnaire). Therefore, the final number of women included in the study was 708. The recruited women were at the age of 18 to 49 years and lived in Zhabei district. All of them wanted to be pregnant within one year and received free physical check-ups provided by Zhabei District Maternity and Child Care Centre in Shanghai, China.

Research instruments

In this study, the research instruments included the Constitution in Chinese Medicine Questionnaire (CCMQ) which was developed by Wang et al. [8-10] and a baseline information questionnaire. All instruments were developed based on literature review and expert validation.

The CCMQ contains 60 items in a 5-point Likert scale (1, almost not; 5, always happen) and was applied to evaluate the physiological state and constitutions of the participants. The TCM constitution contains nine independent sub-scales (Balanced, Qi-deficiency, Yang-deficiency, Yin-deficiency, Phlegm-dampness, Damp-heat, Stagnant Blood, Stagnant Qi, and Inherited Special Constitutions). The reproducibility ranges from 0.76 to 0.90 for 9 sub-scales and Cronbach's α in each subscale is between 0.72 and 0.80, and the Balanced Constitution measured by CCMQ is positively corrected with SF-36 (r=0.58, P<0.01), while the unbalanced constitutions are negatively corrected with SF-36 (r=0.38~0.54, P<0.01), and all of these were the reliability and validity of the CCMQ in our reports, which proved the availability of the CCMQ [8-10].

The baseline information was comprised of four categories: 1) female demographic characteristics including age, family register, nationality, education, and per capita household income; 2) physical conditions including body mass index (BMI), systolic blood pressure (SBP), diastolic blood pressure (DBP), gum bleeding, history of disease (defined as "yes" for women with any of the following conditions in their medical histories: anaemia, hypertension, diabetes mellitus, heart disease, thyroid disease,

epilepsy, chronic nephritis, malignancy, tuberculosis, hepatitis B, genital system disease, and mental disorder), and history of pregnancy and childbearing (menstrual characteristics, dysmenorrhea, pregnancies, and history of adverse pregnant outcome); 3) diet and behaviour including aversion to meat, eggs or vegetables, preference for raw meat, smoking, and drinking; 4) social psychological factors (job stress, economic stress, and interpersonal relationship stress). Additionally, the variables of social psychological factors were classified into three levels: no (no stress), moderate (women adapt to the stress quickly, and the stress did not influence their job or life), and heavy (women cannot adapt to stress quickly, and the stress had influenced their job or life such as having physical symptoms or psychological symptoms related to stress).

Data analysis

All statistical analyses were performed using the Statistics Analysis System (SAS) for Windows, version 9.2. The measurement data were expressed as mean ± standard deviation (SD) and analysed with independent sample t-test. The count data were expressed as percentage and analysed with Chi-square test. The variables that had significant differences that were less than or equal to 0.05 were selected for the logistic regression analysis.

Because the significant differences of family register and nationality were less than 0.05 in the Chi-square test, these two characteristics were used as adjusted variables in the logistic regression analysis. Then, to differentiate the contribution of physical condition, dietary behavior, and social psychological factors on TCM constitutions, variables with significant differences that were less than or equal to 0.05 in the three models of logistic regression analysis were used to build logistic regression models. Ultimately, a multinomial logistic regression analysis was used to explore the exact correlation between factors and special unbalanced constitutions and the significant level was 0.05.

Results

Seven hundred and eight women participated in this study with an age range of 21.3 to 41.4 years old and a mean age of 28.3±3.0 years old. Among them, twenty-two (3.1%) women were aged 35 years and above. Additionally,
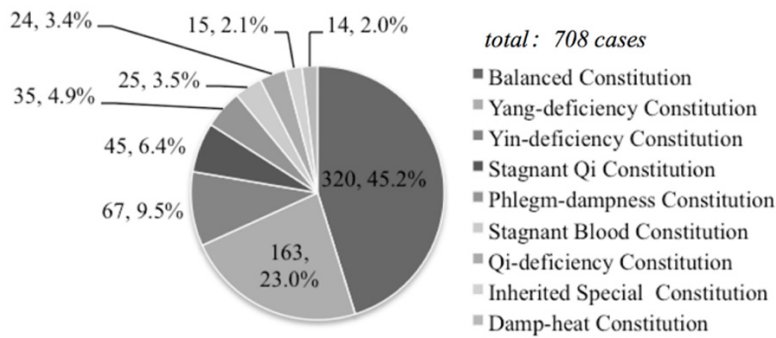
Figure 1. The distribution of TCM constitution in women of childbearing age.

87.3% women were college-educated and above, and 9.6% women completed senior secondary school.

No women had diabetes mellitus, chronic nephritis, epilepsy, malignancy, or mental disorders.

The distribution of women's TCM constitution

Fifty-five percent (n=388) of these women had unbalanced constitutions. The distribution of nine types of TCM constitution was as follows: Balanced Constitution (320, 45.2%), Yang-deficiency Constitution (163, 23.0%), Yin-deficiency Constitution (67, 9.5%), Stagnant Qi Constitution (45, 6.4%), Phlegm-dampness Constitution (35, 4.9%), Stagnant Blood Constitution (25, 3.5%), Qideficiency Constitution (24, 3.4%), Inherited Special Constitution (15, 2.1%) and Damp-heat Constitution (14, 2.0%). See **Figure 1**.

The analysis of factors associated with TCM constitution

It was found that residence in Shanghai (P=0.003), Han nationality (P=0.043), gum bleeding (P<0.001), dysmenorrhea (P=0.022), aversion to vegetables (P=0.029), preference for raw meat (P=0.021), job stress (P<0.001), economic stress (P<0.001), and interpersonal relationship stress (P<0.001) were risk factors of Balanced Constitution according to the chi-square tests. See **Table 1**.

According to the logistic regression analysis, Shanghai residence (AOR=-1.744, P=0.002), dysmenorrhea (AOR=1.310, P=0.046), and gum bleeding (AOR=1.833, P=0.000) were significantly negatively associated with unbalanced Constitution in the logistic regression model of physical condition (**Figure 2**); Shang-

hai residence (AOR=1.825, P=0.001), preference for raw meat (AOR=2.676, P=0.041) and aversion to vegetables (AOR=2.442, P=0.049) were negatively significantly associated with unbalanced Constitution in the logistic regression model of dietary behavior (**Figure 3**); Shanghai residence (AOR=1.905, P=0.001), job stress (AOR= 2.216, P=0.000) and economic stress (AOR=1.469, P=0.030) were negatively significantly associated with Balanced Constitution in the logistic regression model of social psychological factors (**Figure 4**). Additionally, only the variables of dysmenorrhea and preference for raw meat were not significantly associated with unbalanced Constitution in the total logistic regression analysis (**Figure 5**).

In the multinomial logistic regression analysis, we found that residence in Shanghai was significantly associated with Yang-deficiency Constitution (AOR=2.362, P=0.047), and Stagnant Qi Constitution (AOR=1.616, P=0.032); gum bleeding was significantly associated with Yin-deficiency Constitution (AOR=4.220, P= 0.000), Stagnant Blood Constitution (AOR= 1.750, P=0.048), Stagnant Qi Constitution (AOR=1.633, P=0.020), and Inherited Special Constitution (AOR=4.020, P=0.000); aversion to vegetables was significantly associated with Yang-deficiency Constitution (AOR=4.501, P= 0.040) and Damp-heat Constitution (AOR= 8.013, P=0.000); job stress was significantly associated with Yang-deficiency Constitution (AOR=3.852, P=0.000), Phlegm-dampness Constitution (AOR=6.130, P=0.045), Damp-heat Constitution (OR=3.532, P=0.000), Stagnant Blood Constitution (AOR=2.513, P=0.000), and Stagnant Qi Constitution (AOR=1.901, P=0.003); and economic stress was significantly associated with Yang-deficiency Constitution (AOR=2.270, P=0.007), and Stagnant Qi Constitution (AOR=1.646, P=0.000). See **Table 2**.

Discussion

In this study, 55% women who wanted to be pregnant had unbalanced constitutions. Wang et al. reported that in the Chinese general population, people with unbalanced constitutions

Table 1. Analysis of associated factors of Balanced Constitution

Variables	Balanced Constitution		χ^2/t	P
	Yes (n=320)	No (n=388)		
Demographic characteristics				
Age (year), mean ± SD	28.25±3.20	28.24±2.75	0.041	0.969
Capital income, n (%)			1.833	0.176#
<1000	3 (1.0)	2 (0.5)		
1000-2000	4 (1.3)	5 (1.3)		
2000-3000	17 (5.4)	18 (4.7)		
3000-4000	50 (15.8)	49 (12.8)		
4000-5000	58 (18.4)	67 (17.5)		
>5000	184 (58.2)	241 (63.1)		
Residence in Shanghai (Yes), n (%)	214 (67.1)	309 (79.8)	14.828	0.000
Han nationality (Yes), n (%)	308 (97.2)	9 (2.8)		0.043*
Physical condition				
BMI (Kg/m²), mean ± SD	20.83±2.61	21.01±2.70	0.901	0.369
SBP (mmHg), mean ± SD	109.5±10.33	108.0±11.07	1.842	0.067
DBP (mmHg), mean ± SD	67.11±7.90	68.84±7.13	0.458	0.644
Gum bleeding (Yes), n (%)	75 (23.5)	146 (37.8)	16.626	<0.001
History of disease (Yes), n (%)	42 (13.2)	63 (16.2)	1.306	0.253
Anaemia (Yes), n (%)	19 (5.9)	37 (9.5)	3.118	0.077
Hypertension (Yes), n (%)	0 (0.0)	1 (0.3)		1.000*
Heart disease (Yes), n (%)	1 (0.3)	6 (1.6)		0.085*
Thyroid disease (Yes), n (%)	17 (5.3)	15 (43.9)	0.850	0.357
Tuberculosis (Yes), n (%)	0 (0.0)	1 (0.3)		1.000*
Hepatitis B (Yes), n (%)	3 (0.9)	3 (0.8)		0.305*
Gynaecological disease (Yes), n (%)	30 (9.4)	45 (11.6)	0.915	0.339
Irregular menstrual cycle (Yes), n (%)	26 (8.2)	46 (11.9)	2.628	0.105
Menstrual volume, n (%)			1.482	0.224#
Much	23 (7.2)	32 (8.3)		
Moderate	273 (85.6)	309 (79.6)		
Little	23 (7.2)	47 (12.1)		
Dysmenorrhea, n (%)			5.288	0.022#
Heavy	15 (4.7)	40 (10.3)		
Mild	196 (61.4)	234 (60.3)		
Prior pregnancy (Yes), n (%)	72 (22.6)	85 (22.0)	0.046	0.830
History of stillbirth or abortion (Yes), n (%)	8 (2.6)	12 (3.3)	0.254	0.614
Diet and behaviour				
Aversion to meat/egg (Yes), n (%)	4 (1.3)	3 (0.7)		0.241*
Aversion to vegetables (Yes), n (%)	7 (2.2)	21 (5.4)	4.766	0.029
Preferences for raw meat (Yes), n (%)	6 (1.9)	20 (5.2)	5.326	0.021
Smoking (Yes), n (%)	4 (1.3)	11 (2.8)	2.108	0.147
Drinking (Yes), n (%)	8 (2.5)	7 (1.8)	0.404	0.524
Psychological factors				
Job stress, n (%)			51.598	<0.001#
Heavy	7 (2.2)	52 (13.4)		
Moderate	216 (67.9)	286 (73.9)		
Economic stress, n (%)			34.688	<0.001#
Heavy	7 (2.2)	25 (6.5)		
Moderate	141 (44.3)	237 (61.2)		
Interpersonal relationship stress, n (%)			22.276	<0.001#
Moderate	68 (21.3)	146 (37.6)		
No	252 (78.7)	242 (62.4)		

Notes: *P-value of Fisher's Exact Test; #P-value of χ^2_{MHC}.
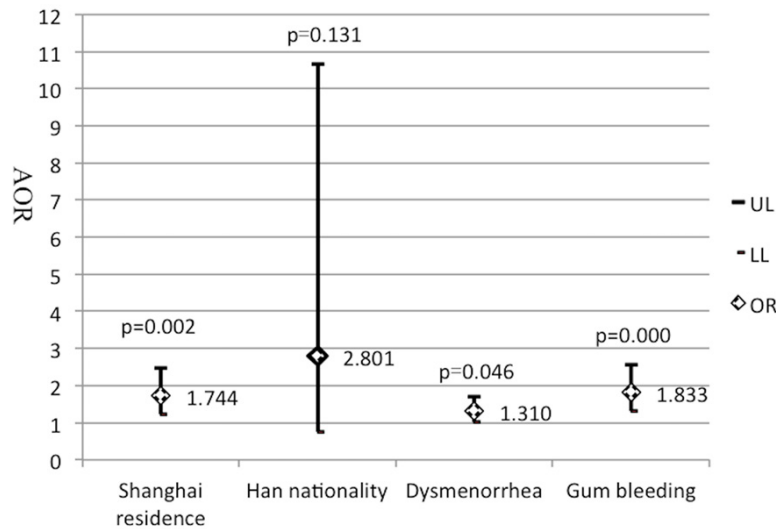
Figure 2. Logistic regression model of physical condition and unbalanced constitution (family register, nationality, dysmenorrhea and gum bleeding were put in the model).
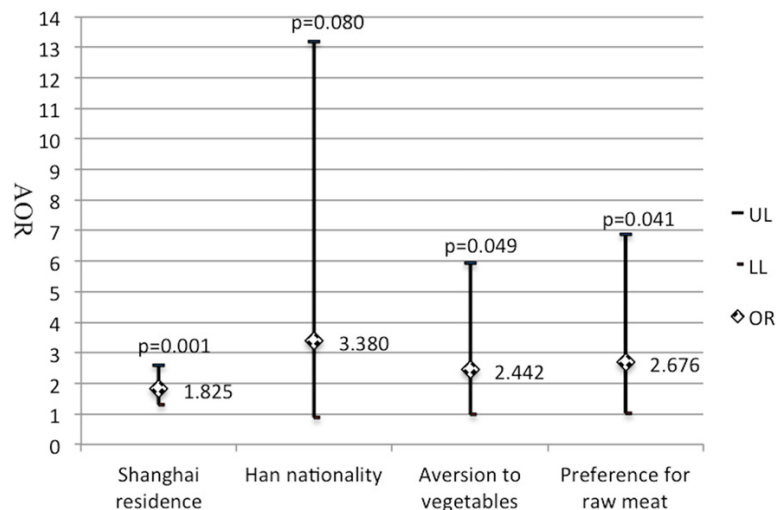

Figure 3. Logistic regression model of dietary behavior and unbalanced constitution (family register, nationality, preference for raw meat and aversion to vegetables were put in the model).

legm-dampness were significantly associated with pregnancy discomfort [15]. In addition, Coyle et al. reported that 53.9% women who used assisted reproduction were diagnosed with kidney Yang-deficiency and that the quality of mental health and the emotional role and social function domains of the SF36 were negatively associated with Qi or Blood stagnation [22]. The assessment of personality (nervous, shy or self-conscious, obsessed, angry or a worrier), psychiatric history, recent life events, and sociodemographics which are outward manifestations of Qi Constitution stagnation, would be beneficial for early identification of postnatal depression [23]. Moreover, the identification of constitution during preconception care would be helpful to better understand the health status, provide more choices and personalized services for women and promote the health of mothers-to-be, so as to reduce the risks during pregnancy and childbearing.

Women whose family registered in Shanghai were more likely to have unbalanced constitutions, especially Yang-deficiency and Stagnant Qi. This finding may be related to the geographical and climatic characteristics of the Shanghai region and the more fast-paced and pressured lifestyles in Shanghai. For example, the fact that people always stay indoors with air conditioner during hot seasons as well as the lack of outdoor exercise would all lead to the damage of Yang-Qi.

Gum bleeding might indicate the existence of some unbalanced Constitutions (e.g., Yin-deficiency, Stagnant Blood, Stagnant Qi, and Inherited Special). However, dysmenorrhea was

accounted for 67.86% [21]. This difference might be due to the fact that the average age of the subjects in this study is relatively younger (28.3±3.0 versus 41.57±15.91). The study showed that Yang-deficiency Constitution, Yin-deficiency Constitution, Stagnant Qi Constitution, and Phlegm-dampness Constitution were the most common four types of unbalanced constitutions. Women with unbalanced constitutions are more likely to experience discomfort symptoms and risks during the future pregnancy as Yang-deficiency, Yin-deficiency, and Ph-
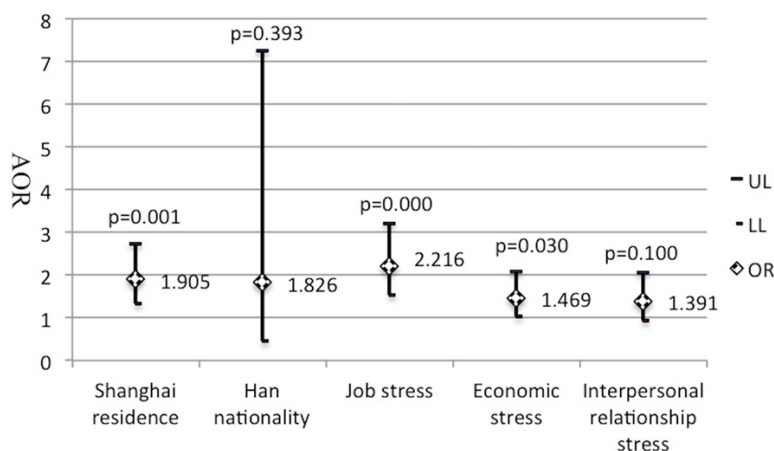
Figure 4. Logistic regression model of psychological factors and unbalanced constitution (family register, nationality, job stress, economic stress and interpersonal relationship stress were put in the model).
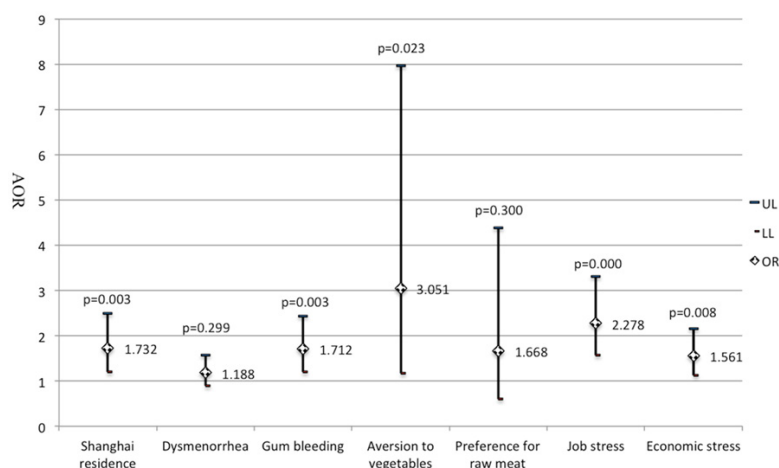

Figure 5. The total logistic regression model of the related factors and unbalanced constitution (family register, dysmenorrhea, gum bleeding, preference for raw meat, aversion to vegetables job stress and economic stress were put in the model).

dysmenorrhea. However, in this cross-sectional study, the causal relationship between TCM constitution and gum bleeding/dysmenorrhea cannot be determined. But this study implied that attention should be given to women with gum bleeding and dysmenorrhea in a timely manner to prevent the adverse effects. Personalized treatment based on TCM constitution would be helpful for ameliorating gum bleeding and dysmenorrhea.

Dietary behavior was associated with TCM constitution. Aversion to vegetables was associated with unbalanced Constitutions, especially Damp-heat Constitution. From the TCM perspective, a key element of maintaining Balanced Constitution is comprehensive, balanced, and moderate dietary intake. Mineral substances, vitamins, and dietary fibre contained in vegetables are necessary for nutrient balance. Additionally, dietary fibre can regulate glucolipid metabolism and is beneficial to digestive function. TCM states that the spleen and stomach, parts of the digestive system, are the fundamental factors of acquired constitution and the source of Qi, where blood is generated. Sufficient and balanced Qi and blood are helpful for women's menstruation, pregnancy, delivery, and breastfeeding. Moreover, functional digestion is helpful for the excretion of Damp-heat. Thus, vegetable intake is good for Balanced Constitution by regulating digestive function. Additionally, various vegetables and foods have different features according to the theory of TCM. For example, yams, sweet potatoes and potatoes, which can reinforce the spleen and strengthen Qi, are good for the Qi-deficiency constitution. Therefore, women should choose various types

not significantly associated with TCM constitution in the total variables' logistic regression analysis. Gum bleeding may be caused by gum disease (e.g., gingivitis and periodontitis) that was associated with oral health behavior, as well as other diseases (e.g., leukemia, asthma, self-reported COPD, and chronic kidney disease) [24-26]. From the perspective of TCM, gum bleeding may be caused by stomach/spleen/liver heat, which can exhaust an individual's spirit and blood and be harmful to Balanced Constitution. Additionally, Qi and blood are directly related to menstruation. Weak Qi may block the flow of blood and cause

Table 2. Comparison between unbalanced constitution groups and balanced constitution group using multinomial regression analysis

Factors	Qi-deficiency (n=24)			Yang-deficiency (n=163)			Yin-deficiency (n=67)			Phlegm-dampness (n=35)			Damp-heat (n=14)			Stagnant Blood (n=25)			Stagnant Qi (n=45)			Inherited Special (n=15)		
	AOR	95% CI	P	AOR	95% CI	P	AOR	95% CI	P	AOR	95% CI	P	AOR	95% CI	P	AOR	95% CI	P	AOR	95% CI	P	AOR	95% CI	P
Residence in Shanghai	5.886	0.751-46.104	0.182	2.362	1.003-5.602	0.047	2.938	0.847-10.230	0.214	5.733	0.728-44.869	0.181	1.253	0.549-2.842	0.600	1.388	0.742-2.584	0.180	1.616	1.028-2.498	0.032	1.571	0.557-4.430	0.602
Gum bleeding	2.682	0.901-7.958	0.083	1.258	0.617-2.556	0.283	4.220	1.801-9.922	0.000	1.038	0.309-3.471	0.488	0.839	0.357-1.966	0.488	1.750	1.001-3.102	0.048	1.633	1.071-2.504	0.020	4.020	1.698-9.532	0.000
Aversion to vegetables		None		4.501	1.019-19.801	0.040	1.963	0.878-26.880	0.201		None		8.013	2.032-31.596	0.000	2.549	0.606-10.743	0.286	2.913	0.957-8.792	0.079	2.623	0.292-23.677	0.633
Job stress	1.322	0.361-4.784	0.559	3.852	1.781-8.369	0.000	1.673	0.658-4.476	0.276	6.130	1.881-20.011	0.045	3.532	1.501-8.292	0.000	2.513	1.361-4.652	0.000	1.901	1.200-3.023	0.003	1.956	0.716-5.312	0.133
Economic stress	2.303	0.748-7.041	0.180	2.270	1.179-4.372	0.007	1.963	0.827-4.626	0.136	0.698	0.246-1.929	0.589	1.753	0.852-3.568	0.589	1.078	0.631-1.856	0.102	1.646	1.103-2.472	0.000	1.971	0.821-4.722	0.096

Note: The reference group is Balanced Constitution (n=320); OR, odds ratio; CI, confidence interval; none: the OR can't be calculated because of the zero sample in the sub-group.

of vegetables and foods according to their own constitution features. As we all know, raw meat is not a type of common food as it is indigestible and carries microbes. In this study, it was found that preference for raw meat was significantly and positively associated with Yin-deficiency and Inherited Special Constitution only in the logistic regression model of dietary behaviour. However, the number of participants preferred raw meat in this study was only 20, so the relationship between this behaviour and TCM constitution should be demonstrated in a study with a larger sample size.

Stress was significantly and negatively associated with Balanced Constitution. This finding was similar to Wang's, which revealed that stress levels were significantly and positively correlated with the constitutions of Yang-deficiency, Yin-deficiency, and Phlegm-dampness and higher stress levels were associated with greater tendencies of these three unbalanced constitutions [15]. In this study, the results showed that job stress was significantly and positively associated with Yang-deficiency, Phlegm-dampness, Damp-heat, Stagnant Blood, and Stagnant Qi Constitutions and that economic stress was significantly and positively associated with Yang-deficiency and Stagnant Qi Constitutions, while interpersonal relationship was not associated with TCM constitution in the logistic regression analysis. This finding may be caused by the fact that the number of women with heavy stress in an interpersonal relationship was zero. Women with stress may feel anxious and may not have a peaceful mood and emotional disorders can damage Yang-Qi and cause Yang-Qi deficiency, and excessive emotional activities can also impact heat, which exhausts Yin-Blood and causes Yin-deficiency [12, 13]. Disharmonious mood and essence-spirit would cause Yin-Yang disharmony, disturbance of Qi and blood, dysfunction of Zang-organs, and dysfunction of Fu-organs and would influence the individual TCM constitution [27]. Additionally, it was reported that women with psychosocial stress would have more frequent use of health care services such as obstetrics and gynaecology visits, general health counselling, and pregnancy planning counselling [28]. Therefore, if suggestions for reducing stress and dietary/life adjustment based on TCM constitution can be integrated into modern female health care, the health of women with stress would improve.

This study presented the following limitations. First, this study was a cross-sectional study that was weak in its argument of cause-and-effect. The connection between variables (residence in Shanghai, aversion to vegetables, preference for raw meat, gum bleeding, dysmenorrhea, job stress, and economic stress) and the TCM constitution should be demonstrated by a prospective cohort study. Second, the odds ratio (OR) of some of the variables could not be estimated properly because of the small sample size in the sub-classification during the multinomial logistic analysis, which may reduce statistical power. Third, few participants of this study had medical conditions, so the relationship between medical conditions and the TCM constitution could not be estimated.

This study revealed that women might have potential TCM constitution risks even if they didn't have medical conditions, as more than half of the participants in the study had unbalanced constitutions, which were disadvantageous to health of maternal and fetal/new-born health. Residence in Shanghai, dysmenorrhea, gum bleeding, aversion to vegetables, preference for raw meat, job stress, and economic stress were significantly associated with various unbalanced constitutions and these factors may be considered to be risks of unbalanced constitutions. Therefore, applying the theory of TCM constitution to preconception care would be beneficial for personalized health care services that provide to women who want to have baby by giving them better women health and dietary education and improving their constitution conditions.

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Disclosure of conflict of interest

None.

Address correspondence to: Jing Wang, Tongji Hospital Affiliated to Tongji University, No.389 Xincun Road, Shanghai 200065, China. Tel: +86-189185-13937; E-mail: wj123jingwang@163.com

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