

Different traditional Chinese medicine constitution is associated with dietary and lifestyle behaviors among adults in Taiwan

Min-Fen Hsu, RN, MS^{a,b}, Pei-Ling Tang, RN, PhD^{c,d,e} , Tzu-Cheng Pan, BS^c, Kuang-Chieh Hsueh, MD^{f,g,*}

Abstract

The World Health Organization states prevention of chronic diseases should be based on good lifestyle behaviors and healthy diets as they can reduce the risk of chronic diseases by 80%. The theory of traditional Chinese medicine constitution (TCMC) emphasizes the congenital differences of TCMC stem from the genes of parents, while acquired differences in TCMC are caused by factors as living environments, lifestyle behaviors, and dietary habits. From the perspective of preventive medicine, this study explores the correlation between dietary habits and lifestyle behaviors as potential risk factors for different types of TCMC—balanced constitution, Yang deficiency, Yin deficiency, and Phlegm stasis. Research data were collected from 2760 subjects aged 30 to 70 years participating in a survey conducted by Taiwan Biobank in 2012 to 2017. The survey included basic demographic characteristics, lifestyle behaviors, and dietary habits along with a Body Constitution Questionnaire. Compared to men, women were 3 to 4 times more likely to develop Yang-deficiency, Yin-deficiency, and Phlegm stasis. Variables that affected TCMC were smoking, midnight snack consumption, consumption of gravy-soaked or lard-soaked rice/noodles, deep-fried soybean products, bread spread, pickled vegetables as side dishes for the main course of a meal, and the dietary habit of vegetables or fruits instead of high-fat desserts. Poor dietary habits and lifestyle behaviors are the cause of unbalanced TCMCs. Understanding the specific TCMC of individual can provide useful information and predictions to maintain physical health and achieve early disease prevention to meet the goal of preventive medicine.

Abbreviations: AOR = adjusted odds ratio, BCQ = Body Constitution Questionnaire, BMI = body mass index, TCM = traditional Chinese medicine, TCMC = traditional Chinese medicine constitution, TWB = Taiwan Biobank.

Keywords: behavior, chronic disease, dietary habits, lifestyle, traditional Chinese medicine

1. Introduction

Dietary habits and lifestyle behaviors are key factors influencing health. The Western pattern diet and refined foods are positively correlated with an elevated incidence of chronic disease including cardiovascular disease, colon cancer, diabetes, obesity, and metabolic syndrome,^[1,2] and chronic diseases accounted for 71% of global deaths in 2015.^[3] For chronic diseases, the rise in prevalence at a young age is not a sign of aging but rather results from poor lifestyles such as smoking, lack of exercise, obesity, alcoholism, or poor dietary habits such as reduced consumption of vegetables, fruits, nuts, whole grains, beans, fish, and low-sodium foods.^[2] The World Health Organization stated that the good lifestyles and healthy diets can reduce the risk of developing chronic diseases by 80%.^[4]

Traditional Chinese medicine (TCM) is a commonly used complementary and alternative medicine that has proven effective for chronic disease prevention and treatment.^[5] The theory of TCM constitution (TCMC) is a branch of TCM emphasizing that congenital differences in TCMC stem from the genes of the parents, while acquired differences in TCMC are caused by factors such as living environments, lifestyle behaviors, and dietary habits.^[6] According to the TCMC theory originated in the Yellow Emperor's Canon of Medicine dated 2000 body constitution, which elaborates on the theoretical basis of TCM and explains the basic principles of TCM using the theory of Yin and Yang and the 5-element theory.^[7,8] The TCMC theory states that the circulation of qi maintains the physiological functions of the body, the body balance is maintained through the complementary relationship between Yin and Yang, diseases result

This work was supported by the Kaohsiung Veterans General Hospital, Taiwan (ROC) (grant numbers KSVGH111-D01-3).

The authors have no conflicts of interest to disclose.

The datasets generated during and/or analyzed during the current study are not publicly available, but are available from the corresponding author on reasonable request.

^a Department of Nursing, Pingtung Veterans General Hospital, Pingtung, Taiwan (ROC), ^b Department of Nursing, Meiho University, Pingtung, Taiwan (ROC), ^c Research Center of Medical Informatics, Kaohsiung Veterans General Hospital, Kaohsiung, Taiwan (ROC), ^d School of Nursing, Fooyin University, Kaohsiung, Taiwan (ROC), ^e School of Nursing, Kaohsiung Medical University, Kaohsiung, Taiwan (ROC), ^f Department of Family Medicine, Kaohsiung Veterans General Hospital, Kaohsiung, Taiwan (ROC), ^g Department of Nursing, Shu-Zen Junior College of Medicine and Management, Kaohsiung, Taiwan (ROC).

*Correspondence: Kuang-Chieh Hsueh, Department of Family Medicine, Kaohsiung Veterans General Hospital, 386, Dazhong 1st Road, Kaohsiung City 81362, Taiwan (ROC) (e-mail: kjhsuch@gmail.com).

Copyright © 2022 the Author(s). Published by Wolters Kluwer Health, Inc. This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial License 4.0 (CCBY-NC), where it is permissible to download, share, remix, transform, and buildup the work provided it is properly cited. The work cannot be used commercially without permission from the journal.

How to cite this article: Hsu M-F, Tang P-L, Pan T-C, Hsueh K-C. Different traditional Chinese medicine constitution is associated with dietary and lifestyle behaviors among adults in Taiwan. *Medicine* 2022;101:39(e30692).

Received: 24 January 2022 / Received in final form: 22 August 2022 / Accepted: 23 August 2022

<http://dx.doi.org/10.1097/MD.00000000000030692>

from Yin-Yang imbalance and interruption of qi.^[8] The TCMC scale developed by Taiwanese researchers enables the systematic classification of constitution into 4 types (Yin deficiency, Yang deficiency, Phlegm stasis, and balanced constitution), with different constitutions exerting different influences on physiological characteristics, disease susceptibility, and disease progression.^[6] Body Constitution Questionnaire (BCQ), an effective and useful tool, has been developed for evaluation of the composition of Yin deficiency, Yang deficiency, and Phlegm stasis.^[9–13]

The TCM theory advocates that a healthy lifestyle should be based on a good understanding of TCMC and that the TCM theory should be used to correct misconceptions about health and lifestyle behaviors.^[14] TCMC is a relative variable in the life process and a key influencing factor of diseases.^[15] Individual-specific recommendations for improving lifestyle behaviors to maintain and improve physical health should be made by using the combination of 5-element and Yin-Yang theories with a focus on maintaining the internal balance of the body based on individual-specific TCMC, cold-heat pattern, and emotion.^[16,17] The TCMC theory states that only a balanced constitution represents a healthy body state, unbalanced body states that may be highly susceptible to some diseases.^[18]

To date, TCM still fails to have a clear definition of composite, and the treatment mechanisms are ambiguous, leading to questioning, criticism, and challenge.^[8] Thus, high-quality studies are needed to confirm the close correlation between TCMC and chronic diseases. This study aimed to clarify the correlation between dietary habits and lifestyle behaviors as potential risk factors according to different body constitution types (balanced constitution, Yang deficiency, Yin deficiency, and Phlegm stasis).

2. Methods

2.1. Data source and sample

This was a cross-sectional study design. Between 2012 and 2017, we collected from 2760 subjects who participated in a survey conducted by Taiwan Biobank (TWB). After excluding subjects with a body mass index (BMI) below 18.5 kg/m² and those failing to provide relevant information. They were frequency-matched at a ratio of 1:1 by age, gender, and BMI. The TWB aims to build a nationwide research database that integrates genomic/epigenomic profiles, lifestyle patterns, dietary habits, environmental exposure history, and long-term health outcomes of 300,000 residents of Taiwan.^[19,20] Data were obtained from the TWB, a national biobank accessible to researchers that contains health information collected from Taiwan residents aged 30 to 70 years between 2008 and 2017. Clinical studies with TWB carried out in Taiwan have shown encouraging results, and it has been widely used in studies involving chronic diseases.^[21–24]

2.2. Measurements

The survey contents comprised basic demographic characteristics and lifestyle behaviors (alcohol consumption, cigarette smoking, betel nut consumption, exercise habits, tea or coffee drinking, vegetarian diets, midnight snack consumption, and dietary supplement use). Dietary habit information was collected using the questionnaire designed for the Nutrition and Health Survey in Taiwan,^[25] which comprised 17 questions about the dietary status within the last month. Each question was constructed using appropriate frequency and intensity scale descriptors and scored on a 5-point Likert scale with answer choices of “like this,” “mostly like this,” “fifty-fifty,” “mostly not like this,” and “not like this at all.” The subjects were also administered a TCMC survey.

This study adopted the BCQ, developed by a TCMC and syndrome research team in Taiwan.^[9–13] The BCQ was used to measure the psychological and physiological states of deviations

in body constitution in each patient during the past month. The BCQ comprised 44 questions about 3 constitution types: Yang deficiency, Yin deficiency, and Phlegm stasis, with each question constructed using appropriate frequency and intensity scale descriptors and scored on a 5-point Likert scale. If the total score of a subject satisfied the identification criterion of a constitution, the subject was considered to have that constitution. That is, the 19 Yang deficiency questions scored ≥ 31 points means Yang deficiency and the 19 Yin deficiency questions scored ≥ 29.5 points means Yin deficiency; the 16 Phlegm stasis questions scored ≥ 27 points means Phlegm stasis. The final score of each constitution type was calculated by summing the scores of all items of each subscale, with a higher score implying a greater deviation from the constitution balance. Yang deficiency, Yin deficiency, and Phlegm stasis are unbalanced constitutions^[9–13]; if the total score of a subject failed to meet any of the criteria, the subject was considered not to have a single type of TCMC and to instead have a balanced constitution. The Cronbach α coefficients and intra-group correlation coefficients for Yang deficiency, Yin deficiency, and Phlegm stasis were 0.88 and 0.91,^[9,10] 0.85 and 0.91,^[11,12] and 0.88 and 0.91,^[13] respectively.

2.3. Ethical consideration

Recruitment of individuals in the TWB project was performed in accordance with relevant regulations and guidelines, and the present study was approved by the Institutional Review Board of Kaohsiung Veterans General Hospital in Taiwan (VGHKS18-CT6-03).

2.4. Statistical analysis

Data analyses were performed using IBM SPSS Statistics (version 22.0, Inc, Chicago, IL) software. The variables analyzed in the study included TCMC (Yang deficiency, Yin deficiency, Phlegm stasis, or balanced constitution), age, sex, marital status, living alone or not, education level, and BMI, as well as lifestyle behaviors including alcohol consumption, cigarette smoking, betel nut consumption, exercise habits, tea drinking, coffee drinking, vegetarian diet, midnight snack consumption, and dietary supplement use. Dietary habits were classified into 3 frequency categories: “rare,” “occasional,” and “frequent” consumption. Stepwise regression analysis was performed to explore the effects of dietary habits and lifestyle behaviors on TCMC. $P < .05$ indicated statistical significance.

3. Results

This study enrolled total of 2760 subjects aged 30 to 70 years (means 48.69 ± 10.07), including 740 (26.8%), 499 (18.1%) 584 (21.2%), and 360 (13.0%) with balanced constitution, Yang deficiency, Yin deficiency, and Phlegm stasis, respectively. Females accounted for 51.6% of the study population, more than half were married (82.4%), most not lived alone (94.7%), and about 60% had received college or above. The BMI was 24.02 ± 2.60 kg/m², with more than 50% of subjects above 24. Of the subjects with balanced constitution, 54.2% is male and 83.9% is married, subjects not living alone accounted for 94.8% and 60.8% above college education, 49.9% with BMI 18.5 to 24.0 kg/m² (Table 1). Regarding lifestyle behaviors, subjects with balanced constitutions responded “No” alcohol consumption (91.7%), cigarette smoking (72.8%), betel nut consumption (95.0%), tea drinking (59.4%), coffee drinking (68.9%), vegetarian diet (90.4%), and midnight snack consumption (73.4%). Additionally, 52.3% and 55.1% of subjects reported no exercise habits and dietary supplement use (Table 2).

Table 3 shows that after adjusting for age, BMI, sex, lifestyle behavior, and dietary habits, stepwise logistic regression revealed that the odds of developing Yang deficiency or Phlegm

Table 1
Relationship of TCMC with demographic characteristics.

Characteristics	Total (n = 2760)	Normal constitution		Unbalanced constitution types					
		Balanced		Yang deficiency		Yin deficiency		Phlegm stasis	
		No (n = 2020)	Yes (n = 740)	No (n = 2261)	Yes (n = 499)	No (n = 2176)	Yes (n = 584)	No (n = 2400)	Yes (n = 360)
n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
Age (yr), mean ± SD	48.69 ± 10.072	47.28 ± 9.37	49.42 ± 9.00	49.47 ± 9.052	46.22 ± 9.17	49.06 ± 9.07	47.67 ± 9.376	49.20 ± 9.12	46.35 ± 9.12
Sex									
Female	1423 (51.6)	497 (67.2)	926 (45.8)	1075 (47.5)	151 (30.3)	1028 (47.2)	395 (67.6)	1160 (48.3)	26.3 (73.1)
Male	1337 (48.4)	243 (32.8)	1094 (54.2)	1186 (52.5)	348 (69.7)	1148 (52.8)	189 (32.4)	1240 (51.7)	97 (26.9)
Marital status									
Single	484 (17.6)	159 (21.5)	325 (16.1)	364 (16.1)	120 (24.1)	364 (16.8)	120 (20.6)	396 (16.5)	88 (24.5)
Married	2272 (82.4)	580 (78.5)	1692 (83.9)	1894 (83.9)	378 (75.9)	1809 (83.2)	463 (79.4)	2001 (83.5)	271 (75.5)
Living alone									
No	2614 (94.7)	699 (94.5)	1915 (94.8)	2146 (94.9)	468 (93.8)	2062 (94.8)	552 (94.5)	2273 (94.7)	341 (94.7)
Yes	146 (5.3)	41 (5.5)	105 (5.2)	115 (5.1)	31(6.2)	114 (5.2)	32 (5.5)	127 (5.3)	19 (5.3)
Education level									
Elementary and junior high school	262 (9.5)	77 (10.4)	185 (9.2)	218 (9.6)	44(8.8)	199 (9.1)	63 (10.8)	225 (9.4)	37 (10.3)
Senior high school (vocational)	842 (30.5)	236 (31.9)	606 (30.0)	679 (30.0)	163(32.7)	652 (30.0)	190 (32.6)	716 (29.8)	126 (35.1)
College or above*	1654(59.9)	426 (57.6)	1228 (60.8)	1363 (60.4)	291(58.4)	1324 (60.9)	330 (56.6)	1458 (60.8)	196 (54.6)
BMI (kg/m²), mean ± SD	24.02 ± 2.60	23.90 ± 2.67	24.06 ± 2.57	24.087 ± 2.57	23.704 ± 2.71	24.02 ± 2.59	24.00 ± 2.62	24.00 ± 2.59	24.11 ± 2.67
18.5–24.0	1398 (50.7)	376 (50.8)	1022 (50.6)	1129 (49.9)	269(53.9)	1110 (51.0)	288 (49.3)	1222 (50.9)	176 (48.9)
24.1–27.0	970 (35.1)	264 (35.7)	706 (35.0)	802 (35.5)	168(33.7)	755 (34.7)	215 (36.8)	842 (35.1)	128 (35.6)
27.1–30.0	392 (14.2)	100 (13.5)	292 (14.5)	330 (14.6)	62(12.4)	311 (14.3)	81 (13.9)	336 (14.0)	56 (15.6)

BMI = body mass index, n = number, SD = standard deviation, TCMC = traditional Chinese medicine constitution.

*College or above, college or post-graduate education.

stasis varied by a factor of 0.983 ($P < .001$) and 0.985 ($P = .005$) per year of age, indicating that the younger was more likely to develop Yang deficiency or Phlegm stasis. The odds of developing Yang deficiency varied by a factor of 0.949 ($P = .0007$) per unit of BMI, indicating that the lower the BMI, the easier it was to develop Yang deficiency; women were more likely to develop Yang deficiency than men (adjusted odds ratio [AOR] = 3.87, $P < .001$), Yin deficiency (AOR = 3.15, $P < .001$), or Phlegm stasis (AOR = 4.98, $P < .001$); subjects who smoked cigarettes were more likely to develop Yang deficiency (AOR = 1.72, $P < .001$), Yin deficiency (AOR = 1.55, $P = .002$), or Phlegm stasis (AOR = 2.04, $P < .001$); subjects without exercise habits were more likely to develop Phlegm stasis (AOR = 0.75, $P = .028$); subjects without a habit of drinking tea were more likely to develop Yin deficiency (AOR = 0.79, $P = .021$); and subjects who ate midnight snacks were more likely to develop Yang deficiency (AOR = 1.46, $P < .001$), Yin deficiency (AOR = 1.27, $P = .024$), or Phlegm stasis (AOR = 1.54, $P < .001$).

This study revealed the significant effects of dietary habits on the occurrence of a given type of TCMC. Subjects who frequently ate gravy-soaked or lard-soaked rice/noodles, deep-fried soybean products, occasionally or frequently ate bread spread, occasionally ate pickled vegetables as side dishes for the main course of a meal, and occasionally or frequently ate low-sodium products were more likely to develop Yang deficiency than those who rarely did. Subjects who occasionally or frequently ate gravy-soaked or lard-soaked rice/noodles, deep-fried soybean products, occasionally ate at least 2 kinds of vegetables in a day, occasionally or frequently ate stir-fried dishes and occasionally low-fat foods instead of general products were more likely to develop Yin deficiency than those who rarely did. Subjects who occasionally or frequently ate gravy-soaked or lard-soaked rice/noodles, bread spread, occasionally ate at least 2 kinds of vegetables in a day and occasionally or frequently ate low-sodium

products were more likely to develop Phlegm stasis than those who rarely did.

4. Discussion

This study explored the relationship between basic demographic characteristics, lifestyle behaviors, and dietary habits of subjects and their TCMC. After adjusting for age, BMI, sex, lifestyle habits, supplements, and dietary habits, the analysis revealed that dietary habits and lifestyle behaviors were predictors of TCMC. Factors with significant negative effects on the occurrence of balanced constitution were positively correlated with the occurrence of Yang deficiency, Yin deficiency, and Phlegm stasis.

At present, the most widely used instruments for classification of constitution types include, among others, the Constitution in Chinese Medicine Questionnaire, which was developed in Mainland China,^[26] and the BCQ, which was developed in Taiwan.^[19–13] Although Mainland China is very similar to Taiwan, the lifestyle, language, and culture are different.^[27] Compare to Constitution in Chinese Medicine Questionnaire, this questionnaire is easily administered and its reliability and validity have been established in quite a few studies.^[12,28,29] The analysis revealed younger age to be associated with an increased likelihood of developing Yang deficiency or Phlegm stasis, a finding similar to those of a Hong Kong-based study by Sun et al^[30] that age is a preventive factor for Yin deficiency, Phlegm stasis, qi deficiency, and Wetness-heat constitution. This may be attributed to the fact that Yang and qi gradually decline with age; moreover, the older the age, the less likely individuals are to engage in heavy work and face various work-related pressures, thereby alleviating qi and Yin deficiency. Heli et al^[31] investigated the health status of young people with different TCMC types, reporting that under the pressure of heavy work and economic conditions, more and more young people have

Table 2
Theory of TCMC and participant lifestyle characteristics.

Characteristics	Total (n = 2760) n (%)	Normal constitution		Unbalanced constitution types					
		Balanced		Yang deficiency		Yin deficiency		Phlegm stasis	
		No (n = 2020)	Yes (n = 740)	No (n = 2261)	Yes (n = 499)	No (n = 2176)	Yes (n = 584)	No (n = 2400)	Yes (n = 360)
Alcohol consumption									
No	2536 (91.9)	684 (92.4)	1852 (91.7)	2075 (91.8)	461 (92.4)	1999 (91.9)	537 (92.0)	2207 (92.0)	329 (91.4)
Yes	224 (8.1)	56 (7.6)	168 (8.3)	186 (8.2)	38 (7.6)	177 (8.1)	47 (8.0)	193 (8.0)	31 (8.6)
Cigarette smoking									
No	2037 (73.8)	567 (76.6)	1470 (72.8)	1657 (73.3)	380 (76.2)	1591 (73.1)	446 (76.4)	1764 (73.5)	273 (75.8)
Yes	723 (26.2)	173 (23.4)	550 (27.2)	604 (26.7)	119 (23.8)	585 (26.9)	138 (23.6)	636 (26.5)	87 (24.2)
Betel nut consumption									
No	2628 (95.2)	709 (95.8)	1919 (95.0)	2148 (95.0)	480 (96.2)	2066 (94.9)	562 (96.2)	2284 (95.2)	344 (95.6)
Yes	132 (4.8)	31 (4.2)	101 (5.0)	113 (5.0)	19 (3.8)	110 (5.1)	22 (3.8)	116 (4.8)	16 (4.4)
Exercise									
No	1059 (54.7)	453 (61.2)	964 (47.7)	1186 (52.5)	323 (64.7)	1158 (53.2)	351 (60.1)	1266 (52.8)	243 (67.5)
Yes	1251 (45.3)	287 (38.8)	1056 (52.3)	1075 (47.5)	176 (35.3)	1018 (46.8)	233 (39.9)	1134 (47.3)	117 (32.5)
Tea drinking									
No	1669 (60.5)	469 (63.4)	1200 (59.4)	1345 (59.5)	324 (64.9)	1285 (59.1)	384 (65.8)	1446 (60.3)	223 (61.9)
Yes	1091 (39.5)	271 (36.6)	820 (40.6)	916 (40.5)	175 (35.1)	891 (40.9)	200 (34.2)	954 (39.8)	137 (38.1)
Coffee drinking									
No	1881 (68.2)	489 (66.1)	1392 (68.9)	1556 (68.8)	325 (65.1)	1487 (68.3)	394 (67.5)	1650 (68.8)	231 (64.2)
Yes	879 (31.8)	251 (33.9)	628 (31.1)	705 (31.2)	174 (34.9)	689 (31.7)	190 (32.5)	750 (31.3)	129 (35.8)
Vegetarian diet									
No	2491 (90.3)	665 (89.9)	1826 (90.4)	2044 (90.4)	447 (89.6)	1961 (90.1)	530 (90.8)	2167 (90.3)	324 (90.0)
Yes	269 (9.7)	75 (10.1)	194 (9.6)	217 (9.6)	52 (10.4)	215 (9.9)	54 (9.2)	233 (9.7)	36 (10.0)
Midnight snack consumption									
No	1962 (71.1)	479 (64.7)	1483 (73.4)	1650 (73.0)	312 (62.5)	1576 (72.4)	386 (66.1)	1743 (72.6)	219 (60.8)
Yes	798 (28.9)	261 (35.3)	537 (26.6)	611 (27.0)	187 (37.5)	600 (27.6)	198 (33.9)	657 (27.4)	141 (39.2)
Dietary supplement consumption									
No	1221 (44.3)	315 (42.6)	906 (44.9)	1008 (44.6)	213 (42.7)	973 (44.7)	248 (42.5)	1073 (44.7)	148 (41.1)
Yes	1538 (55.7)	425 (57.4)	1113 (55.1)	1252 (55.4)	286 (57.3)	1202 (55.3)	336 (57.5)	1326 (55.3)	212 (58.9)

n = number, TCMC = traditional Chinese medicine constitution.

suboptimal health status, meaning they are in a borderline state between healthy and diseased states. Heli et al^[31] also reported that 31.19% of men have a balanced constitution, compared to about 20% of women; Lee et al^[32] also showed a higher proportion of unbalanced constitutions in women than that in. These reports are consistent with the finding of this study that female subjects were 3 to 4 times more likely to develop unbalanced constitutions compared to male subjects, which may be attributed to the physiological characteristics and personalities of women.^[33]

Regarding lifestyle behaviors, data analysis revealed that subjects with Yang deficiency had a low BMI on average and that those who did not have an exercise habit had Phlegm stasis. The most obvious features of individuals with Yang deficiency are feeling cold, low subcutaneous fat, and low BMI.^[30,34] In addition, most of the subjects who did not have an exercise habit exhibited Phlegm stasis, a finding consistent with the notion in the TCM theory that exercise can facilitate the flow of qi to eliminate qi deficiency and prevent Phlegm stasis.^[30] This study also found that subjects who smoked cigarettes or ate midnight snacks were 1.8 and 1.5 times more likely to develop Phlegm stasis than those without, respectively. Cigarette smoking is well known to harm health and individuals who smoke cigarettes are more likely to with Yang deficiency, Yin deficiency, and Phlegm stasis, while individuals who eat midnight snacks are prone to Yang deficiency and Phlegm stasis.^[30] Phlegm stasis is a basic type of constitution usually characterized by poor lifestyle behaviors such as cigarette smoking, irregular

sleep, broiled food consumption, and limited physical activity. Individuals with this constitution are prone to obesity, diabetes, and other metabolic diseases.^[35] Another finding of the present study was that subjects without a habit of drinking tea were prone to Yin deficiency. Individuals with Yin deficiency often present with a number of subjective symptoms such as thirst, dry eye, hot flush, constipation, small urine volume, rapid heart rate, and a higher risk of insomnia.^[17,31,36] Tea contains caffeine, theophylline, and other alkaloids, all of which can excite the central nervous system; thus, individuals with Yin deficiency opt to drink tea less frequently to avoid insomnia. However, some studies have pointed out that drinking an appropriate tea may help to relieve depression, overcome sleep problems, and improve digestion.^[6,37] As shown above, insights into TCMC can provide useful information for the adjustment of lifestyle behaviors such as the use of appropriate tea products, to alleviate body constitution.

Dietary habits can influence the sufficiency or deficiency of qi, blood, Yin, and Yang via the transportation and transformation functions of the spleen and stomach, thereby forming stable functional trends and constitutional characteristics.^[38] The results of the present study revealed the significant impact of dietary habits on different TCMC types; that is, subjects with balanced constitutions had healthier dietary habits, while subjects with Yang deficiency, Yin deficiency, and Phlegm stasis frequently ate deep-fried products, bread spread, pickled products, stir-fried dishes, and low-sodium products with rare consumption of vegetables or fruits to replace high-fat desserts. Similarly, Jiang et al^[39] also reported a negative

Table 3

Stepwise regression analysis for demographic characteristics, dietary habits, and lifestyle behaviors and associations with TCMC.

Variables	Normal constitution		Unbalanced constitution types					
	Balanced		Yang deficiency		Yin deficiency		Phlegm stasis	
	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI
Age (yr)			0.98	(0.97–0.99)***			0.98	(0.97–0.99)*
BMI			0.95	(0.91–0.99)**				
Sex								
Female vs male	0.3	(0.24–0.37)***	3.87	(2.96–50.6)***	3.15	(2.47–4.01)***	4.98	(3.61–6.85)***
Alcohol consumption								
Yes vs no								
Cigarette smoking								
Yes vs no	0.69	(0.54–0.89)**	1.72	(1.29–2.31)***	1.55	(1.18–2.02)**	2.04	(1.45–2.85)***
Exercise								
Yes vs No							0.75	(0.58–0.97)*
Tea drinking								
Yes vs no					0.79	(0.65–0.97)**		
Consumption of midnight snacks								
Yes vs no	0.71	(0.58–0.86)***	1.46	(1.17–1.83)**	1.27	(1.03–1.57)**	1.54	(1.20–1.98)**
Dietary habits								
Consumption of gravy-soaked or lard-soaked rice/noodles								
Occasional vs rare	0.75	(0.56–1.01)	1.38	(0.99–1.92)	1.5	(1.11–2.04)**	1.62	(1.13–2.32)*
Frequent vs rare	0.63	(0.49–0.81)***	1.5	(1.13–1.99)**	1.6	(1.24–2.08)***	1.64	(1.20–2.23)**
Consumption of deep-fried soybean products								
Occasional vs rare	0.7	(0.53–0.28)*	1.34	(0.98–1.83)	1.37	(1.03–1.83)*		
Frequent vs rare	0.65	(0.48–0.90)*	1.46	(1.03–2.07)*	1.45	(1.04–2.01)*		
Consumption of bread spread								
Occasional vs rare	0.59	(0.41–0.86)*	1.62	(1.08–2.43)*			1.68	(1.08–2.62)*
Frequent vs rare	0.7	(0.49–1.00)*	1.57	(1.08–2.29)*			1.67	(1.11–2.49)**
Consumption of pickled vegetables as side dishes during meals								
Occasional vs rare	0.55	(0.35–0.87)*	2.1	(1.31–3.37)**				
Frequent vs rare	1.86	(1.04–3.32)*	0.65	(0.34–1.28)				
Consumption of at least 2 types of vegetables per day								
Occasional vs rare	0.56	(0.34–0.93)*			1.88	(1.11–3.17)*	2	(1.07–3.74)*
Frequent vs rare	1.07	(0.73–1.58)			0.86	(0.57–1.29)	1.09	(0.66–1.81)
Consumption of low-sodium products								
Occasional vs rare			1.63	(1.12–2.36)*			1.6	(1.06–2.41)*
Frequent vs rare			1.33	(1.07–1.65)*			1.37	(1.07–1.75)*
Consumption of vegetables or fruits instead of high-fat desserts								
Occasional vs rare	0.97	(0.74–1.27)						
Frequent vs rare	1.31	(1.08–1.60)**						
Consumption of fried dishes								
Occasional vs rare					1.43	(1.07–1.92)*		
Frequent vs rare					1.5	(1.15–1.93)*		
Consumption of low-fat foods instead of general products								
Occasional vs rare					1.58	(1.11–2.25)*		
Frequent vs rare					1.18	(0.96–1.46)		

Adjusting for age, BMI, sex, lifestyle behavior, and dietary habits.

AOR = adjusted odds ratio, BMI = body mass index, CI = confidence interval, TCMC = traditional Chinese medicine constitution.

**P* < .05.

***P* < .01.

****P* < .001.

correlation between the occurrence of a balanced constitution and individuals who liked meat products and disliked vegetables show a negative correlation.

As shown above, individual differences, lifestyle behaviors, and dietary habits all affect TCMC and serve as important factors to alleviate Yang deficiency, Yin deficiency, and Phlegm stasis.^[40] Selecting an appropriate treatment or recuperation method is key to maintaining a balanced constitution. However, this study had several limitations. For example, the survey of tea drinking habits focused on whether tea leaves or tea ingredients were contained in the drinks (excluding flower tea) but did not collect information about individual preferences for tea types; secondly, specific occupational and disease data were not collected, which may have affected the objectivity of the results. The current findings of this study, however, confirm the effects of dietary habits and lifestyle behaviors on TCMC.

5. Conclusions

Factors such as dietary habits and lifestyle behaviors can cause individual differences in TCMC. Understanding the influencing factors of TCMC for a given individual will provide useful information to maintain balanced constitution and health. Such understanding plays an indispensable role in health promotion and treatment of preventive medicine.

Acknowledgments

This research has been conducted using the Taiwan Biobank resource. We thank all the participants and investigators of the Taiwan Biobank and the Editage Company Ltd. for their technical and English editing services.

Author contributions

Conceptualization: Min-Fen Hsu, Pei-Ling Tang.

Formal analysis: Kuang-Chieh Hsueh, Tzu-Cheng Pan.

Supervision: Pei-Ling Tang, Kuang-Chieh Hsueh.

Writing – original draft: Min-Fen Hsu, Pei-Ling Tang, Kuang-Chieh Hsueh.

Writing – review & editing: Min-Fen Hsu, Pei-Ling Tang, Tzu-Cheng Pan, Kuang-Chieh Hsueh.

References

- [1] Aboul-Enein BH, Bernstein J, Neary AC. Dietary transition and obesity in selected Arabicspeaking countries: a review of the current evidence. *East Mediterr Health J*. 2017;22:763–70.
- [2] Locke A, Schneiderhan J, Zick SM. Diets for health: goals and guidelines. *Am Fam Physician*. 2018;97:721–8.
- [3] Wang H, Naghavi M, Allen C, et al. Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet*. 2016;388:1459–544.
- [4] World Health Organization; WHO. Integrated chronic disease prevention and control. Available at: https://www.who.int/chp/about/integrated_cd/en/. Accessed December 26, 2022.
- [5] Bahall M. Complementary and alternative medicine usage among cardiac patients: a descriptive study. *BMC Complement Altern Med*. 2015;15:100.
- [6] Sun Y, Zhao Y, Xue SA, et al. The theory development of traditional Chinese medicine constitution: a review. *J Tradit Chin Med Sci*. 2018;5:16–28.
- [7] Cavalieri S, Rotoli M. Huangdi Neijing: a classic book of traditional Chinese medicine. *Recent Prog Med*. 1997;88:541–6.
- [8] Qiu J. Traditional medicine: a culture in the balance. *Nature*. 2007;448:126–8.
- [9] Chen LL, Lin JS, Lin JD, et al. BCQ+: a body constitution questionnaire to assess Yang-Xu. Part II: evaluation of reliability and validity. *Forsch Komplementmed*. 2009;16:20–7.
- [10] Su YC, Chen LL, Lin JD, et al. BCQ+: a body constitution questionnaire to assess Yang-Xu. Part I: establishment of a first final version through a Delphi process. *Forsch Komplementmed*. 2008;15:327–34.
- [11] Lin JD, Chen LL, Lin JS, et al. BCQ-: a body constitution questionnaire to assess Yin-Xu. Part I: establishment of a provisional version through a Delphi process. *Forsch Komplementmed*. 2012;19:234–41.
- [12] Lin JS, Chen LL, Lin JD, et al. BCQ: a Body Constitution Questionnaire to assess Yin-Xu. Part II: evaluation of reliability and validity. *Forsch Komplementmed*. 2012;19:285–92.
- [13] Lin JD, Lin JS, Chen LL, et al. BCQs: a Body Constitution Questionnaire to assess Stasis in traditional Chinese medicine. *Eur J Integr Med*. 2012;4:e379–91.
- [14] Evans M, Paterson C, Wye L, et al. Lifestyle and self-care advice within traditional acupuncture consultations: a qualitative observational study nested in a co-operative inquiry. *J Altern Complement Med*. 2011;17:519–29.
- [15] Feng YL, Zheng GY, Ling CQ. The investigation of the correlation between metabolic syndrome and Chinese medicine constitution types in senior retired military personnel of the People's Liberation Army. *Chin J Integr Med*. 2012;18:485–9.
- [16] Yin J, Zhang H, Ye J. Traditional Chinese medicine in treatment of metabolic syndrome. *Endocr Metab Immune Disord Drug Targets*. 2008;8:99–111.
- [17] Li L, Yao H, Wang J, et al. The role of Chinese medicine in health maintenance and disease prevention: application of constitution theory. *Am J Chinese Med*. 2019;47:495–506.
- [18] You H, Zhang T, Feng W, et al. Association of TCM body constitution with insulin resistance and risk of diabetes in impaired glucose regulation patients. *BMC Complement Altern Med*. 2017;17:459.
- [19] Chen CH, Yang JH, Chiang CWK, et al. Population structure of Han Chinese in the modern Taiwanese population based on 10,000 participants in the Taiwan Biobank project. *Hum Mol Genet*. 2016;25:5321–31.
- [20] Taiwan Biobank. (2020). Data Access Details. Available at: https://www.twbiobank.org.tw/new_web/about-export.php. Accessed December 26, 2022.
- [21] Lin WY, Chan CC, Liu YL, et al. Performing different kinds of physical exercise differentially attenuates the genetic effects on obesity measures: evidence from 18,424 Taiwan Biobank participants. *PLoS Genet*. 2019;15:e1008277.
- [22] Nassef Y, Lee KJ, Nfor ON, et al. The impact of aerobic exercise and badminton on hdl cholesterol levels in adult taiwanese. *Nutrients*. 2019;11.
- [23] Huang HC, Lin FC, Wu MF, et al. Association between chronic obstructive pulmonary disease and PM2.5 in Taiwanese nonsmokers. *Int J Hyg Environ Health*. 2019;222:884–8.
- [24] Liu YT, Nfor ON, Wang L, et al. Interaction between Sex and LDLR rs688 polymorphism on hyperlipidemia among Taiwan Biobank adult participants. *Biomolecules*. 2020;10.
- [25] Health Promotion Administration, Taiwan: Ministry of Health and Welfare. 2013–2016 Nutrition and Health Survey in Taiwan (NAHSIT). Available at: <https://www.hpa.gov.tw/EngPages/Detail.aspx?nodeid=1077&pid=6201>. Accessed December 26, 2022.
- [26] Qi W. Classification and diagnosis basis of nine basic constitutions in Chinese medicine. *J Beijing Univ Tradit Chin Med*. 2005;28:1.
- [27] Wong W, Lam CL, Su YC, et al. Measuring body constitution: validation of the Body Constitution Questionnaire (BCQ) in Hong Kong. *Complement Ther Med*. 2014;22:670–82.
- [28] Lee S, Park J, Lee H, et al. Development and validation of Yin-Deficiency questionnaire. *Am J Chin Med*. 2007;35:11–20.
- [29] Langevin HM, Badger GJ, Povolny BK, et al. Yin scores and yang scores: a new method for quantitative diagnostic evaluation in traditional Chinese medicine research. *J Altern Complement Med*. 2004;10:389–95; discussion 387.
- [30] Sun Y, Liu P, Yi Z, et al. Characteristics of TCM constitutions of adult Chinese women in Hong Kong and identification of related influencing factors a cross-sectional survey. *J Transl Med*. 2014;12:140.
- [31] Heli L, Li Z, Zhiqiang C, et al. Physical and mental health conditions of young college students with different Traditional Chinese Medicine constitutions in Zhejiang Province of China. *J Tradit Chin Med*. 2015;35:703–8.
- [32] Lee CH, Li TC, Tsai CI, et al. Association between albuminuria and different body constitution in type 2 diabetes patients: Taichung Diabetic body constitution study. *Evid Based Complement Alternat Med*. 2015;2015:603048.
- [33] Morakinyo OM, Adebowale AS, Obembe TA, et al. Association between household environmental conditions and nutritional status of women of childbearing age in Nigeria. *PLoS One*. 2020;15:e0243356.
- [34] Li M, Mo S, Lv Y, et al. A study of traditional Chinese medicine body constitution associated with overweight, obesity, and underweight. *Evid Based Complement Alternat Med*. 2017;2017:7361896.
- [35] Yao H, Mo S, Wang J, et al. Genome-wide DNA methylation profiles of phlegm-dampness constitution. *Cell Physiol Biochem*. 2018;45:1999–2008.
- [36] Yu X, Sun S, Guo Y, et al. Citri Reticulatae Pericarpium (Chenpi): botany, ethnopharmacology, phytochemistry, and pharmacology of a frequently used traditional Chinese medicine. *J Ethnopharmacol*. 2018;220:265–82.
- [37] Chang SM, Chen CH. Effects of an intervention with drinking chamomile tea on sleep quality and depression in sleep disturbed postnatal women: a randomized controlled trial. *J Adv Nurs*. 2016;72:306–15.
- [38] Zhu Y, Wang Q, Dai Z, et al. Case-control study on the associations between lifestyle-behavioral. *J Tradit Chin Med*. 2014;34:286–92.
- [39] Jiang QY, Li J, Zheng L, et al. Constitution of traditional Chinese medicine and related factors in women of childbearing age. *JCMA*. 2018;81:358–65.
- [40] Li Y, Li XH, Huang X, et al. Individualized prevention against hypertension based on Traditional Chinese Medicine Constitution Theory: a large community-based retrospective, STROBE-compliant study among Chinese population. *Medicine*. 2017;96.