Postprint: A Survey on the Application Status and Needs of Traditional Chinese Medicine Preventive and Therapeutic Measures for Diabetes among Physicians at All Levels of Hospitals in China

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Abstract

Background Traditional Chinese Medicine (TCM) plays an important role in diabetes prevention and treatment by improving clinical symptoms, preventing complications, synergistically lowering blood glucose, and enhancing quality of life. Physicians are the core force in medical practice. Currently, investigations into the application status and needs of physicians regarding TCM prevention and treatment measures for diabetes are still relatively lacking.

Objective To investigate and understand the application status and needs of TCM prevention and treatment measures for diabetes among physicians at various levels of hospitals in China.

Methods A cross-sectional survey was conducted among physicians from 192 cities in 30 provinces nationwide from September 22, 2021 to October 29, 2021 using a snowball sampling method. Information on participants' basic characteristics, current usage status and needs of TCM prevention and treatment measures was collected. Rank-transformed non-parametric test methods were used for comparative analysis among physicians from different hospital levels.

Results A total of 1,150 physician samples were included, comprising 556 males (48.35%) and 594 females (51.65%); the mean age was (40.9$±$8.8) years; 606 (52.70%) practiced TCM, and 544 (47.30%) practiced clinical medicine. In clinical diagnosis and treatment of diabetes, statistically significant differences were observed in the usage frequencies of decoctions, Chinese patent medicines, Chinese medicine granules, Chinese medicine fumigation and washing, acupoint application, and auricular points among TCM practitioners from different hospital

levels (all P<0.05). Statistically significant differences were also found in the usage frequencies of decoctions, Chinese medicine granules, acupuncture, Chinese medicine fumigation and washing, and auricular points among clinical medicine physicians from different hospital levels (all P<0.05). Among them, TCM practitioners showed relatively high proportions of "always or frequently using" three categories of TCM prevention and treatment measures: TCM dietary therapy (84.16%), decoctions (67.82%), and Chinese patent medicines (50.50%). Clinical medicine physicians demonstrated relatively high proportions of "always or frequently using" Chinese patent medicines (42.10%) and TCM dietary therapy (39.71%). Physicians from different hospital levels primarily adopted TCM treatment measures when patients developed diabetes complications, when patients had obvious clinical symptoms, and in cases of pre-diabetes. The main problems addressed by physicians from different hospital levels using TCM to treat diabetes included improving diabetes symptoms, treating complications, and synergistically enhancing efficacy with Western medicine therapies. Statistically significant differences were observed in the comparisons of TCM knowledge cognition among TCM practitioners from different hospital levels regarding the use of Chinese patent medicines for diabetes, knowledge of Chinese herbal formulas, appropriate TCM techniques, traditional exercise methods, TCM theoretical knowledge, TCM syndrome explanations, and TCM pattern differentiation explanations (all P<0.05). A statistically significant difference was also found in the cognition of appropriate TCM technique operations for diabetes among clinical medicine physicians from different hospital levels (P=0.004).

Conclusion Physicians from different specialties and hospital levels exhibit distinct characteristics and differences in the application status and needs of TCM prevention and treatment measures for diabetes. Future training programs should be formulated based on physicians' needs and characteristics, with enhanced training efforts for primary-level physicians, and focused development of targeted and prioritized training and promotion programs for TCM prevention and treatment measures.

Full Text

Investigation on the Application Status and Demand of Traditional Chinese Medicine Prevention and Treatment Measures for Diabetes among Physicians in Hospitals at All Levels of China

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Abstract

Background Traditional Chinese Medicine (TCM) plays a significant role in diabetes management by alleviating clinical symptoms, preventing complications, enhancing glycemic control, and improving quality of life. Physicians are the cornerstone of clinical practice. However, there remains a paucity of surveys investigating physicians' current utilization and unmet needs regarding TCM-based diabetes prevention and treatment strategies.

Objective To investigate the application status and needs of physicians in different level hospitals of TCM prevention and treatment measures for diabetes.

Methods A cross-sectional survey was conducted among physicians across 192 cities in 30 provinces of China from September 22, 2021 to October 29, 2021, using the snowball sampling method in the form of online self-filled questionnaires. Data collected included participants' demographic information, current utilization of TCM-based diabetes prevention/treatment measures, and perceived needs. Rank-transformed nonparametric tests were used for comparative analysis among physicians from different hospital tiers.

Results A total of 1150 physician samples were included in the analysis, 556 males (48.35%) and 594 females (51.65%), with a mean age of 40.9$±$8.8 years. By specialty, 606 (52.70%) physicians specialized in TCM, while 544 (47.30%) physicians specialized in clinical medicine. Among TCM practitioners, utilization frequencies of herbal decoctions, Chinese patent medicines, herbal granules, herbal fumigation, acupoint application, and auricular therapy differed significantly across hospital tiers (all $P<0.05$); similarly, among clinical medicine practitioners, utilization frequencies of herbal decoctions, herbal granules, acupuncture, herbal fumigation, and auricular therapy showed statistically significant differences across hospital tiers (all $P<0.05$). Notably, physicians specialized in TCM reported higher rates of "regular or frequent use" for TCM dietary therapy (84.16%), herbal decoctions (67.82%), and Chinese patent medicines (50.50%); clinical medicine practitioners most commonly used Chinese patent medicines (42.10%) and TCM dietary therapy (39.71%). Physicians across hospital tiers predominantly employed TCM interventions for diabetes complications, clinically apparent symptoms, or prediabetes, primarily aiming to alleviate symptoms, treat complications, and enhance conventional therapy synergy. Significant inter-tier differences emerged among TCM practitioners in diabetes-related

knowledge domains: Chinese patent medicines, herbal formulations, standardized TCM techniques, traditional exercises, theoretical knowledge, syndrome interpretation, and pattern differentiation (all $P<0.05$), whereas clinical medicine practitioners showed tier-based differences in standardized TCM technique application ($P=0.004$).

Conclusions Physicians from different specialties and hospital tiers demonstrated distinct patterns in both current practices and needs regarding TCM-based diabetes prevention and treatment. Future training programs should be tailored to these professional characteristics, with particular emphasis on enhancing primary care physicians' competencies through targeted TCM intervention training initiatives.

Keywords: Diabetes mellitus; Traditional Chinese Medicine; Physicians; Questionnaire investigation; Application Status; Demands analysis

Introduction

Diabetes is a chronic metabolic disease characterized by hyperglycemia [1]. Over the past three decades, diabetes in China has exhibited increasing prevalence, expanding age range of affected populations, and diverse complications with high disability rates [2]. In Traditional Chinese Medicine, diabetes falls under the category of "Xiaoke disease" (consumptive thirst). The *Huangdi Neijing · Suwen* documented over 2000 years ago [3]: "Rich foods induce internal heat, sweet foods induce fullness, causing qi to overflow upward and transform into consumptive thirst." Through continuous medical practice and exploration by successive generations of practitioners, a comprehensive TCM understanding of diabetes etiology, pathogenesis, diagnosis, and treatment has gradually formed [4].

TCM employs diverse prevention and treatment modalities. Guided by holistic concepts and pattern differentiation treatment principles, interventions including herbal decoctions, medicinal diets, auricular therapy, acupuncture, tuina, and guasha restore yin-yang balance. These approaches play vital roles in diabetes management by improving clinical symptoms, preventing complications, synergistically reducing blood glucose, and enhancing quality of life [5-6]. Physicians constitute the core force in medical practice, and patients' treatments and care primarily derive from medical personnel, with physicians' behaviors directly influencing patient experiences and therapeutic outcomes [7-8]. Currently, surveys investigating physicians' application status and needs regarding TCM diabetes prevention and treatment measures remain scarce, and evaluation data on the application and demand for TCM measures among physicians at different hospital levels in China are lacking. This study investigates the current application status and needs of physicians at various hospital levels regarding TCM diabetes prevention and treatment measures to obtain objective data supporting targeted promotion strategies and future physician training initiatives.

Methods

1.1 Survey Participants

From September 22, 2021 to October 29, 2021, electronic questionnaires were distributed via WeChat to members of the Primary Diabetes Prevention and Treatment Expert Guidance Committee of the China Association of Chinese Medicine or applicants for membership. A cross-sectional survey using snowball sampling was conducted among physicians at medical institutions at all levels, ultimately including questionnaire data from physicians across 192 cities in 30 provinces nationwide. Inclusion criteria were: (1) physicians at medical and health institutions at all levels (including tertiary hospitals, secondary hospitals, and primary care institutions), primarily comprising endocrinologists, general practitioners, TCM practitioners, and integrated Chinese-Western medicine physicians; (2) voluntary participation after reading the informed consent form; (3) questionnaire completion within the designated timeframe; (4) complete data records without logical errors. Exclusion criteria were: (1) non-physician personnel such as nurses, pharmacists, or medical school teachers; (2) questionnaires with severe missing data. Sample size was calculated using the formula N=m×(5~10)×[1+(10%~15%)] [9]; with 90 variables in the questionnaire, the estimated sample size was 10 times the number of variables with a 15% tolerance rate, yielding 1,035. A total of 1,162 questionnaires were distributed and collected, of which 1,150 were valid (excluding 7 nurses, 2 pharmacists, and 3 medical teachers), for an effective response rate of 98.97%. This study was approved by the Medical Ethics Committee of the First Affiliated Hospital of Xiamen University (Approval No.: XMYY-2021KY027-02).

1.2 Survey Questionnaire and Content

The self-designed questionnaire "Application Status and Needs of Physicians at All Levels Regarding TCM Diabetes Prevention and Treatment Measures" comprised 42 items across three sections: basic information, current utilization of TCM prevention/treatment measures, and perceived needs. The questionnaire was refined through pilot surveys and expert consultation. Survey content included: (1) Basic information: age, gender, education level, specialty, years of practice, professional title, administrative position, institution, and department; (2) Current utilization of TCM prevention/treatment measures: frequency of use of herbal decoctions, Chinese patent medicines, herbal granules, acupuncture, tuina, guasha, herbal fumigation, acupoint application, auricular therapy, TCM dietary therapy, and traditional exercise practices; indications for TCM use (e.g., prediabetes meeting WHO diagnostic criteria; newly diagnosed diabetes within one year; clinically apparent symptoms such as thirst, sweating, fatigue, insomnia, constipation, abdominal distension, diarrhea, limb numbness/pain, decreased appetite, frequent urination, hunger, skin itching, anxiety/depression; poor glycemic control indicators such as fasting glucose,

2-hour postprandial glucose, HbA1c; diabetes complications; high-risk diabetes); and primary problems addressed by TCM treatment; (3) Needs regarding TCM prevention/treatment measures: demand for knowledge in Chinese patent medicines, herbal formulation knowledge, standardized TCM techniques, TCM dietary therapy, traditional exercises, TCM theoretical knowledge, syndrome interpretation, and pattern differentiation.

1.3 Survey Methods and Quality Control

The survey was assisted by professionally trained investigators with medical backgrounds. Online links were distributed via the WeChat platform. After questionnaire completion, investigators carefully cross-checked all entries. Questionnaires with obvious omissions, missing items, or logical errors were verified by telephone or excluded to ensure quality. To ensure scientifically valid data, detailed instructions were sent to WeChat groups before survey distribution, informed consent was provided on the first page, and participants were encouraged to complete the questionnaire in a quiet environment.

1.4 Statistical Methods

A database was established using Excel 2010, and SPSS 20.0 software was used for statistical analysis. All analyzed variables were categorical data, expressed as constituent ratios. For R×C tables with bidirectional ordinal attributes of different natures, rank-transformed nonparametric tests were selected for intergroup comparisons across hospital tiers. All hypothesis tests were two-tailed with α=0.05 as the significance level.

Results

A total of 1,150 physicians were surveyed from 192 cities across 30 provinces. Anhui Province contributed 130 physicians (11.30%), Jiangsu 115 (10.00%), Shandong 113 (9.83%), Hebei 103 (8.96%), Fujian 90 (7.83%), and Henan 79 (6.87%). The sample included 556 male physicians (48.35%) and 594 female physicians (51.65%), with a mean age of $40.9 \pm 8.8 years and mean practice duration of 15.98 \pm 9.40$ years. By specialty, 606 physicians (52.70%) practiced TCM or integrated Chinese-Western medicine, while 544 (47.30%) practiced clinical medicine. By professional title, 294 (25.57%) were junior physicians, 389 (33.83%) intermediate, 297 (25.83%) associate chief physicians, and 170 (14.78%) chief physicians. Department distribution was: endocrinology/diabetes 509 (44.26%), TCM 133 (11.57%), general practice 239 (20.78%), and other departments 269 (23.39%).

2.2 Utilization of TCM Measures for Diabetes Across Hospital Tiers

Among TCM practitioners, utilization frequencies of herbal decoctions, Chinese patent medicines, herbal granules, herbal fumigation, acupoint application, and auricular therapy differed significantly across hospital tiers (all $P<0.05$). TCM practitioners reported high rates of "regular or frequent use" for TCM dietary therapy (84.16%, 510/606), herbal decoctions (67.82%, 411/606), and Chinese patent medicines (50.50%, 306/606) .

Among clinical medicine practitioners, utilization frequencies of herbal decoctions, herbal granules, acupuncture, herbal fumigation, and auricular therapy differed significantly across hospital tiers (all $P<0.05$). Clinical medicine practitioners most frequently used Chinese patent medicines (42.10%, 229/544), TCM dietary therapy (39.71%, 216/544), and traditional exercise practices (26.10%, 142/544) .

2.3 Indications for TCM Therapy in Diabetes Management

TCM practitioners at tertiary and secondary hospitals primarily employed TCM interventions for diabetes complications (84.93%, 86.06%), clinically apparent symptoms (80.51%, 75.15%), and prediabetes (73.53%, 54.55%). Primary care physicians more frequently used TCM for prediabetes (57.99%), clinically apparent symptoms (50.89%), poor glycemic control (50.89%), and diabetes complications (50.30%) .

Clinical medicine practitioners at tertiary and secondary hospitals predominantly used TCM for diabetes complications (66.14%, 66.20%), clinically apparent symptoms (50.79%, 42.25%), and prediabetes (34.39%, 35.92%). Primary care physicians more frequently applied TCM for prediabetes (48.36%), diabetes complications (47.89%), and poor glycemic control (45.54%) .

2.4 Primary Problems Addressed by TCM Diabetes Therapy

TCM practitioners at tertiary and secondary hospitals reported that TCM primarily improved diabetes symptoms (92.28%, 89.70%), treated complications (85.29%, 84.85%), and synergistically enhanced conventional therapy efficacy (79.78%, 77.58%). Primary care physicians emphasized symptom improvement (75.15%), constitution regulation (68.05%), and synergistic enhancement of conventional therapy (60.36%) .

Clinical medicine practitioners at tertiary hospitals reported that TCM mainly improved diabetes symptoms (71.43%), synergistically enhanced conventional therapy efficacy (69.31%), and treated complications (62.96%). Secondary hospital practitioners focused on symptom improvement (69.72%), complication treatment (66.20%), and synergistic enhancement (60.56%). Primary care physicians emphasized synergistic enhancement of conventional therapy (59.62%), symptom improvement (56.81%), and regulation of glucose, lipids, blood pressure, and uric acid (52.58%) .

2.5 Cognition of TCM Knowledge for Diabetes Management

Among TCM practitioners, significant inter-tier differences existed in cognition of Chinese patent medicines, herbal formulation knowledge, standardized TCM techniques, traditional exercises, TCM theoretical knowledge, syndrome interpretation, and pattern differentiation (all $P<0.05$). The proportions of TCM practitioners rating these knowledge domains as "very useful" were, in descending order: TCM dietary therapy (69.80%), pattern differentiation instruction (67.99%), herbal formulation knowledge (66.34%), TCM theoretical knowledge (65.02%), syndrome interpretation (63.53%), standardized TCM technique operation (60.40%), Chinese patent medicines (59.41%), and traditional exercises (48.35%) .

Among clinical medicine practitioners, significant inter-tier differences existed in cognition of standardized TCM technique operation ($P=0.004$). The proportions rating knowledge domains as "very useful" were: TCM dietary therapy (51.65%), Chinese patent medicines (45.40%), standardized TCM technique operation (41.18%), traditional exercises (39.89%), pattern differentiation instruction (39.71%), TCM theoretical knowledge (38.05%), syndrome interpretation (37.50%), and herbal formulation knowledge (32.54%) .

Discussion

This study included 1,150 physicians from 192 cities across 30 provinces, with stratified analysis by specialty and hospital level to objectively reflect current application status and needs regarding TCM diabetes prevention and treatment measures. Results demonstrate distinct demand characteristics between specialties and application gaps across hospital tiers, providing objective evaluation data and theoretical support for targeted promotion strategies and clinical training initiatives.

3.1 Specialty-Based Differences in Application Status and Needs

Different specialties exhibited distinct application patterns. TCM practitioners more frequently applied TCM dietary therapy, herbal decoctions, and Chinese patent medicines, whereas clinical medicine practitioners primarily used Chinese patent medicines, with limited application of other TCM measures. This aligns with previous findings that professional backgrounds influence treatment approaches [10]. All physician groups demonstrated high application and demand for TCM dietary therapy, which utilizes food properties to harmonize qi-blood and balance yin-yang [11], warranting enhanced research and promotion. Chinese patent medicines offer convenience and palatability advantages [12], with approximately 60% prescribed by Western medicine physicians in general hospitals [13]. The 2019 National Health Commission notice restricting patent medicine prescribing privileges to physicians with $ $1 year of systematic TCM training encourages "Western medicine physicians learning TCM"

and promotes pattern differentiation-based application, indicating the need for systematic TCM training for clinical medicine practitioners.

Specialty-based differences also emerged in knowledge cognition. TCM practitioners demonstrated higher overall awareness of TCM knowledge, while clinical medicine practitioners rated all knowledge domains lower, with TCM dietary therapy, Chinese patent medicines, and standardized TCM technique operation ranked as most useful. These specialty-specific cognitive patterns provide direction for future guideline development, skills training, and research prioritization [14].

3.2 Hospital Tier-Based Differences in Application and Cognition

Comparisons across hospital tiers revealed significant differences in TCM measure utilization and knowledge cognition, consistent with multiple previous studies [15-18]. Wei et al. [15] found TCM pattern differentiation training correlated positively with hospital grade among 44,773 TCM hospital nurses. Zhou et al. [16] reported low awareness and utilization rates of the Diabetes TCM Guideline among primary care physicians, recommending enhanced training for younger, junior physicians with shorter practice duration. Hu et al. [17] identified varying technology promotion across Shanghai community health centers, advocating strengthened training and publicity for standardized TCM techniques. These findings suggest lower TCM application rates among primary care physicians may relate to insufficient training intensity, warranting enhanced TCM knowledge training, particularly for non-pharmacological therapies (herbal fumigation, acupoint application, auricular therapy) [19] and inter-institutional collaboration.

Notably, significant tier-based differences existed in utilization of herbal decoctions, granules, fumigation, acupoint application, and auricular therapy. Clinical application of decoctions and granules requires proficiency in pattern differentiation, herbal formulation, theoretical knowledge, and syndrome interpretation, indicating need for enhanced specialized training for TCM practitioners. Herbal fumigation, acupoint application, and auricular therapy are effective non-pharmacological interventions characterized by simplicity, ease of operation, minimal adverse effects, and significant efficacy [19]. Herbal fumigation is commonly used for diabetic microvascular complications, particularly peripheral neuropathy and diabetic foot [20-21]. Acupoint application effectively treats diabetic gastroparesis, peripheral neuropathy, and symptoms including constipation and urinary incontinence [22-24]. Auricular therapy offers simple, safe, and low-cost advantages; meta-analysis by Piao et al. [25] demonstrated significant improvements in fasting glucose, 2-hour postprandial glucose, and clinical efficacy when combined with other interventions. These convenient, economical, and effective standardized TCM techniques are widely applied in tertiary and secondary hospitals and should be promoted to primary care institutions.

3.3 Distinctive Characteristics of TCM Application in Diabetes Treatment

TCM application in diabetes treatment exhibited distinctive, consistent patterns across physician groups. Physicians predominantly applied TCM interventions for diabetes complications, clinically apparent symptoms, and prediabetes, aligning with TCM' s advantageous roles. "Symptom improvement and complication prevention" represent key TCM strengths in diabetes management [26-27]. Liu [26] noted that symptoms including thirst, polyuria, polyphagia, fatigue, limb numbness, edema, constipation, and diarrhea rapidly improved or resolved with herbal treatment, which synergistically enhanced hypoglycemic effects while reducing dosage and side effects when combined with conventional medications [28].

3.4 Recommendations for TCM Diabetes Prevention and Treatment Implementation

Based on these findings, we propose the following recommendations: (1) Develop training programs aligned with physician needs and interests [29]. For TCM practitioners, design comprehensive, in-depth, specialized training content; for clinical medicine practitioners, prioritize training in high-demand areas (Chinese patent medicines, TCM dietary therapy, traditional exercises). (2) Strengthen training intensity according to tier-specific status. Studies indicate low awareness, utilization, and citation rates for some TCM techniques primarily result from insufficient understanding, opportunities, and training [30], with training activity levels correlating positively with hospital grade [18]. Enhanced TCM training for primary care physicians is essential, particularly for non-pharmacological therapies (herbal fumigation, acupoint application, auricular therapy) and inter-institutional collaboration. (3) "Symptom improvement and complication treatment" represent crucial TCM advantages [26-27]; future research should continue investigating mechanisms and efficacy of TCM measures in managing common diabetic symptoms and complications.

3.5 Limitations

This study has several limitations. (1) As a questionnaire survey using self-reported indicators, reporting bias may exist. (2) Although the sample exceeded 1,000 physicians nationwide, recruitment through the China Association of Chinese Medicine Primary Diabetes Prevention and Treatment Expert Guidance Committee using snowball sampling (non-random) may limit representativeness, with TCM physician proportions slightly higher than national averages. (3) This descriptive study employed broad questionnaire items to obtain comprehensive information; further research is needed to analyze influencing factors.

In summary, this cross-sectional survey of physicians at all levels revealed specialty- and tier-specific patterns in application status and needs regarding TCM diabetes prevention and treatment measures. TCM practitioners more

frequently applied dietary therapy, herbal decoctions, and patent medicines; clinical medicine practitioners primarily used patent medicines, dietary therapy, and traditional exercises. All physician groups predominantly applied TCM for complications, symptomatic periods, and prediabetes. TCM practitioners demonstrated higher cognition of formulation knowledge, dietary therapy, and pattern differentiation, while clinical medicine practitioners valued dietary therapy, patent medicines, and standardized technique operation. These findings provide crucial theoretical foundation and data support for developing targeted, tier-specific training programs and promotion strategies.

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