

Post-print Analysis of Disease Burden of Xiaoke Disease Attributable to TCM Constitution among Middle-aged and Older Adults in Guangzhou Based on ICD-11

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Abstract

Background: The 72nd World Health Assembly approved the International Classification of Diseases 11th Revision (ICD-11), which for the first time included traditional medicine originating from Traditional Chinese Medicine (TCM) in its chapter coding. Xiaoke disease is coded as SD71 (TM1). Currently, Xiaoke disease is a clinically high-incidence disease, with middle-aged and elderly individuals being high-risk populations, and TCM constitution bias being a risk factor for Xiaoke disease. Currently, there are no studies on the burden of TCM diseases and risk factors.

Objective: Based on the ICD-11 traditional medicine chapter and national TCM standards, this study calculated the disease burden of Xiaoke disease among middle-aged and elderly people in Guangzhou and attributed it to TCM constitution, evaluated the role of TCM constitution monitoring in health management, and provided reference for the prevention and treatment of Xiaoke disease with TCM and the application of constitution theory.

Methods: A cross-sectional survey was conducted from January to December 2020 to investigate the prevalence of Xiaoke disease and TCM constitution distribution among middle-aged and elderly people aged ≥ 50 years in Guangzhou. Using the comprehensive theory of the Global Burden of Disease (GBD), Years of Life Lost (YLL), Years Lived with Disability (YLD), and Disability-Adjusted Life Years (DALY) for Xiaoke disease among middle-aged and elderly people in Guangzhou were calculated to assess the disease burden. Relative Risk (RR) was used to evaluate the risk of different TCM constitutions for Xiaoke disease in middle-aged and elderly individuals.

Results: A total of 1,576 elderly people in Guangzhou were surveyed, with 55 lost to follow-up, and 1,521 valid questionnaires were collected, yielding an

effective response rate of 96.51%. Among them, 782 were male with a median age of 62 (56, 69) years, and 739 were female with a median age of 62 (55, 70) years. The prevalence of Xiaoke disease among middle-aged and elderly people in Guangzhou was 13.08%, with a standardized prevalence rate of 12.64%. The most common TCM constitutions among middle-aged and elderly people in Guangzhou were Phlegm-dampness, Qi-deficiency, and Damp-heat constitutions; among Xiaoke disease patients, the most common were Phlegm-dampness, Yin-deficiency, and Qi-deficiency constitutions. The DALY rate for Xiaoke disease burden was 86.64‰, with a YLL rate of 4.86‰ and a YLD rate of 81.60‰. The proportion of single constitution among middle-aged and elderly people in Guangzhou was 48.98%, while compound constitution accounted for 51.02%. Yin-deficiency constitution was a risk constitution for Xiaoke disease ($RR=1.73$, $P<0.01$), causing a disease burden of 33,092 DALYs, with a DALY rate of 10.98‰, accounting for 12.70% of the disease burden among middle-aged and elderly Xiaoke disease patients. Regarding different age groups, in the 60-69 age group, Phlegm-dampness constitution ($RR=1.62$, $P<0.05$) and Yin-deficiency constitution ($RR=1.80$, $P<0.05$) were risk constitutions. Specifically, the disease burden of Xiaoke disease caused by Phlegm-dampness constitution was 18,530 DALYs, with a DALY rate of 18.75‰, accounting for 21.63% of the disease burden in this age group. The disease burden caused by Yin-deficiency constitution was 10,520 DALYs, with a DALY rate of 10.65‰, accounting for 12.28% of the disease burden in this age group. The combined disease burden caused by Phlegm-dampness and Yin-deficiency constitutions was 26,780 DALYs, with a DALY rate of 27.10‰, accounting for 31.26% of the disease burden in this age group. Regarding different genders, Phlegm-dampness constitution in males ($RR=2.29$, $P<0.01$) and Yin-deficiency constitution in females ($RR=2.27$, $P<0.01$) were risk constitutions for Xiaoke disease. The disease burden of Xiaoke disease caused by Phlegm-dampness constitution in middle-aged and elderly males was 45,017 DALYs, with a DALY rate of 30.96‰, accounting for 36.82% of the disease burden among middle-aged and elderly males. The disease burden caused by Yin-deficiency constitution in females was 28,753 DALYs, with a DALY rate of 18.43‰, accounting for 20.79% of the disease burden among middle-aged and elderly females.

Conclusion: The prevalence of Xiaoke disease among people ≥ 50 years old in Guangzhou is relatively high, and the disease burden of Xiaoke disease is substantial. Yin-deficiency and Phlegm-dampness constitutions are risk constitutions for Xiaoke disease in middle-aged and elderly people. It is recommended to conduct TCM constitution monitoring and management to effectively reduce the disease burden of Xiaoke disease.

Full Text

Preamble

Analysis of Traditional Chinese Medicine Constitutions Attributable to the Burden of Wasting Thirst Disorder among Middle-Aged and Older Adults in Guangzhou Based on ICD-11

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Abstract

Background: The 72nd World Health Assembly adopted the International Classification of Diseases Eleventh Revision (ICD-11), which for the first time included traditional medicine originating from Traditional Chinese Medicine (TCM) in its chapter coding. Wasting thirst disorder is coded as SD71 (TM1). Currently, wasting thirst disorder is a clinically prevalent disease, with middle-aged and older adults being a high-incidence population, and biased TCM constitutions serving as risk factors. However, no research has examined the disease burden of TCM conditions and their risk factors.

Objective: Based on the ICD-11 traditional medicine chapter and national TCM standards, this study calculated the burden of wasting thirst disorder among middle-aged and older adults in Guangzhou and attributed it to TCM constitutions. We evaluated the role of TCM constitution monitoring in health management to provide references for TCM prevention and treatment of wasting thirst disorder and the application of constitution theory.

Methods: A cross-sectional survey was conducted from January to December 2020 to investigate the prevalence of wasting thirst disorder and the distribution of TCM constitutions among adults aged ≥ 50 years in Guangzhou. Using the comprehensive framework of the Global Burden of Disease (GBD), we calculated years of life lost (YLL), years lived with disability (YLD), and disability-adjusted life years (DALY) for wasting thirst disorder in this population to assess the disease burden. Relative risk (RR) was used to evaluate the risk of different TCM constitutions for wasting thirst disorder.

Results: A total of 1,576 older adults in Guangzhou were surveyed, with 55 lost to follow-up, yielding 1,521 valid questionnaires (effective response rate: 96.51%). The sample comprised 782 males (median age: 62 [56, 69] years) and 739 females (median age: 62 [55, 70] years). The prevalence of wasting thirst disorder among middle-aged and older adults in Guangzhou was 13.08%, with a standardized prevalence of 12.64%. The most common constitutions in this population were phlegm-dampness, qi-deficiency, and damp-heat constitutions,

while among wasting thirst disorder patients, phlegm-dampness, yin-deficiency, and qi-deficiency constitutions predominated. The DALY rate for wasting thirst disorder burden was 86.64‰, comprising a YLL rate of 4.86‰ and a YLD rate of 81.60‰. Single constitution accounted for 48.98% of cases, while composite constitutions accounted for 51.02%. Yin-deficiency constitution was identified as a risk constitution for wasting thirst disorder ($RR=1.73$, $P<0.01$), contributing 33,092 DALYs with a DALY rate of 10.98‰, representing 12.70% of the disease burden in this population. In the 60-69 age group, both phlegm-dampness ($RR=1.62$, $P<0.05$) and yin-deficiency ($RR=1.80$, $P<0.05$) constitutions were risk factors. Phlegm-dampness constitution contributed 18,530 DALYs (DALY rate: 18.75‰), accounting for 21.63% of the burden in this age group, while yin-deficiency contributed 10,520 DALYs (DALY rate: 10.65‰), accounting for 12.28%. The combined burden from both constitutions was 26,780 DALYs (DALY rate: 27.10‰), representing 31.26% of the burden in this age group. By gender, phlegm-dampness constitution was a risk factor for males ($RR=2.29$, $P<0.01$), while yin-deficiency constitution was a risk factor for females ($RR=2.27$, $P<0.01$). Phlegm-dampness constitution contributed 45,017 DALYs (DALY rate: 30.96‰) in middle-aged and older males, accounting for 36.82% of their disease burden. Yin-deficiency constitution contributed 28,753 DALYs (DALY rate: 18.43‰) in middle-aged and older females, accounting for 20.79% of their disease burden.

Conclusion: The prevalence of wasting thirst disorder among adults aged ≥ 50 in Guangzhou is relatively high, with a substantial disease burden. Yin-deficiency and phlegm-dampness constitutions are risk constitutions for wasting thirst disorder in this population. TCM constitution monitoring and management can effectively reduce the burden of wasting thirst disorder.

[Keywords] International Classification of Diseases Eleventh Revision; Wasting thirst disorder; Middle-aged; Aged; Global burden of disease; Constitutional type

Introduction

In 2019, the 72nd World Health Assembly adopted the International Classification of Diseases Eleventh Revision (ICD-11), which for the first time included traditional medicine originating from Traditional Chinese Medicine in its chapter coding. This development facilitates the alignment of China's statistical network with international standards while reflecting the information on TCM health services. International disease burden measurement can quantify the health pressure on society from diseases, disabilities, and premature mortality. The inclusion of traditional medicine in ICD-11 establishes a foundation for the statistics, measurement, and attribution of TCM disease burden. However, research on TCM disease burden and risk factor attribution remains scarce.

Wasting thirst disorder (消渴病) refers to conditions characterized by polydipsia,

polyphagia, polyuria, emaciation, or sweet-tasting urine. In ICD-11's traditional medicine chapter, it is translated as "Wasting thirst disorder" with code SD71 (TM1). Western medicine's diabetes mellitus falls under the category of wasting thirst disorder in traditional medicine. This clinically prevalent disease imposes an increasingly heavy burden and has attracted widespread attention from both Chinese and Western medicine. Adults aged 50 years and above represent the key population of concern for wasting thirst disorder. TCM constitution refers to the relatively stable inherent characteristics formed during life processes based on innate endowment and acquired factors, encompassing morphological structure, physiological functions, and psychological states. Numerous studies have demonstrated that constitution bias constitutes a risk factor for TCM diseases. This study, grounded in the ICD-11 traditional medicine chapter and employing GBD measurement methods combined with TCM disease pattern classification features, calculated the disease burden of wasting thirst disorder among middle-aged and older adults in Guangzhou and attributed it to TCM constitutions. We evaluated the role of TCM constitution monitoring in health management to provide evidence for TCM prevention and treatment of wasting thirst disorder, application of constitution theory, and statistical support for the TCM concept of "treating before disease."

Methods

Study Design and Population

Inclusion criteria: (1) Permanent residents of Guangzhou with at least one year of residence; (2) Aged 50 years or older; (3) Clear consciousness with adequate expression and communication abilities, willing to participate voluntarily.

Exclusion criteria: (1) Non-permanent residents of Guangzhou; (2) Residents absent for over one year; (3) Age <50 years; (4) Unwilling to participate; (5) Individuals with psychiatric disorders or other conditions preventing survey completion.

Loss to follow-up criteria: (1) Those unreachable after three consecutive contact attempts at different times; (2) Those refusing participation after three consecutive persuasion attempts at different times.

Sample Size Calculation

Sample size was estimated using the formula $N = Z_{1-\alpha/2}^2 / (p(1-p))$, where $Z_{1-\alpha/2}$ represents the percentile corresponding to area $1-\alpha/2$ under the standard normal distribution. With 95% confidence ($\alpha=0.05$), $Z=1.96$. Parameter p represents expected incidence rate. As no previous prevalence data existed for wasting thirst disorder, we used diabetes prevalence as the reference baseline. Based on 2010 national chronic disease surveillance data showing diabetes prevalence of 19.6%, p was set at 0.196. Parameter d represents the percentage of expected incidence rate, with this study requiring results within 10% of the

true population rate ($=0.1$). The calculated sample size was $N=1.96^2 \times (1-0.196)/(0.1^2 \times 0.196)=1,576$.

Sampling Method

From January to December 2020, a stratified multistage cluster sampling method was employed. Guangzhou has 11 districts with 170 subdistrict offices (or towns). Based on distance from city center and urbanization rate, districts were stratified into old urban areas, new urban areas, and suburban areas. Using a random number table, one district was randomly selected from each stratum as primary sampling clusters. From each selected district, one subdistrict (or town) was randomly chosen as secondary sampling clusters. The required number of communities or administrative villages was then selected from these subdistricts based on the planned survey numbers for each stratum, proportional to the population distribution in Guangzhou.

Diagnostic Criteria

Based on the ICD-11 traditional medicine chapter and “TCM Clinical Terminology Part 1: Diseases” (GB/T 16751.1-2021), two licensed TCM physicians with over five years of practice experience diagnosed wasting thirst disorder through the four diagnostic methods (inspection, auscultation and olfaction, inquiry, and palpation).

Survey Implementation

Before the survey, participants were informed about the study details, and face-to-face questionnaires were administered by professionally trained investigators. TCM constitution identification used the “Classification and Determination of TCM Constitution” scale developed by Academician WANG Qi’s team at Beijing University of Chinese Medicine. This self-assessment scale comprises 60 items across nine subscales (balanced constitution, qi-deficiency constitution, yang-deficiency constitution, yin-deficiency constitution, phlegm-dampness constitution, damp-heat constitution, blood-stasis constitution, qi-stagnation constitution, and special diathesis constitution). Each subscale is converted to a score of 0-100 points. Balanced constitution was defined as a converted score ≥ 60 with all other eight constitution types scoring <40 . Other constitution types were identified when their converted scores reached ≥ 40 .

Quality control measures: (1) Investigators were master’s students with TCM education backgrounds who received unified training on survey objectives and standardized methods before implementation. (2) Questionnaires were completed independently by participants; for those with reading or writing difficulties, investigators provided assistance while avoiding leading language. (3) After collection, questionnaires were checked on-site for completeness, with errors corrected and missing items supplemented immediately. (4) Two data entry clerks

independently entered data using EpiData software, with cross-verification and correction based on paper questionnaires when discrepancies arose.

Disease Burden Calculation

DALY metrics were used to calculate the burden of wasting thirst disorder in Guangzhou, where DALY=YLL+YLD.

The YLL calculation formula was:

$$YLL = C e^{(\beta\alpha)} \{e^{-(\beta+\gamma)(L+\alpha)} [-(\beta+\gamma)(L+\alpha)-1] - e^{-(\beta+\gamma)\alpha} [-(\beta+\gamma)\alpha-1]\} / (\beta+\gamma)^2$$

Where: γ is the discount rate (0.03 in GBD analysis), C is the age-weighting adjustment factor (0.1658), β is the age function parameter (0.04), α is the age at death occurrence, and L is years of life lost due to premature death.

YLD was calculated using prevalence-based formula: $YLD = P \times DW$, where P represents the number of patients in a specific period and DW represents disability weight. DW and mortality data in this study were obtained from our research team's survey results.

Attribution of Disease Burden to TCM Constitution

Comparative risk assessment was used to calculate the population attributable fraction (PAF) for each risk constitution using the formula:

$$PAF = \frac{\sum P_i(RR_i - 1)}{\sum P_i(RR_i - 1) + 1}$$

Where P represents risk factor exposure rate and relative risk (RR) indicates disease risk in exposed versus non-exposed individuals ($RR > 1$ indicates risk constitution). As long-term cohort data on TCM constitution and wasting thirst disorder were unavailable, we corrected RR using odds ratio (OR) with the formula: $RR = OR / [(1 - P_0) + (P_0 \times OR)]$, where P_0 represents disease incidence in non-exposed populations.

The joint PAF from multiple risk constitutions was calculated as: $PAF = 1 - (1 - PAF)$. Attributable burden was computed using $AB = PAF \times B$, where B represents total disease burden and AB represents burden attributable to risk constitutions.

Statistical Analysis

Data were analyzed using IBM SPSS 25.0 software. Categorical data were expressed as percentages. Normally distributed continuous data were presented as $(\bar{x} \pm s)$, while non-normally distributed data were expressed as $M(P_{25}, P_{75})$. Statistical significance was set at $P < 0.05$.

Results

Prevalence and Constitution Distribution

A total of 1,576 middle-aged and older adults in Guangzhou were surveyed, with 55 lost to follow-up, yielding 1,521 valid questionnaires (effective response rate: 96.51%). The sample comprised 782 males (median age: 62 [56, 69] years) and 739 females (median age: 62 [55, 70] years). The study identified 199 wasting thirst disorder cases, yielding a prevalence of 13.08% among middle-aged and older adults (78 males, median age: 70 [67, 74]; 121 females, median age: 70 [67, 72]). Using data from the seventh national census as the standard population, the standardized prevalence was 12.64%. Single constitution was observed in 745 cases (48.98%), while composite constitutions accounted for 776 cases (51.02%). The most common constitutions among Guangzhou's middle-aged and older population were phlegm-dampness, qi-deficiency, and damp-heat constitutions. Among wasting thirst disorder patients, phlegm-dampness, yin-deficiency, and qi-deficiency constitutions predominated.

Disease Burden of Wasting Thirst Disorder

The YLL rate for wasting thirst disorder among middle-aged and older adults in Guangzhou was 4.86‰ (5.44‰ in males, 4.31‰ in females). The YLD rate was 81.60‰ (78.65‰ in males, 84.35‰ in females). The overall DALY rate was 86.64‰ (84.09‰ in males, 88.67‰ in females).

Risk Constitutions and Attributable Burden in the Overall Population

Yin-deficiency constitution was identified as a risk constitution for wasting thirst disorder among middle-aged and older adults in Guangzhou, with affected individuals having 1.73 times higher probability of developing the disease ($RR=1.73$, $P<0.01$). This constitution contributed 33,092 DALYs with a DALY rate of 10.98‰, representing 12.70% of the disease burden in this population [TABLE:3-4].

Age-Specific Risk Constitutions and Attributable Burden

When stratified into four age groups (50-59, 60-69, 70-79, and ≥80 years), phlegm-dampness and yin-deficiency constitutions emerged as risk factors for the 60-69 age group ($RR=1.62$, $P<0.05$; $RR=1.80$, $P<0.05$, respectively). In this age group, phlegm-dampness constitution contributed 18,530 DALYs (DALY rate: 18.75‰), accounting for 21.63% of the age-specific burden. Yin-deficiency constitution contributed 10,520 DALYs (DALY rate: 10.65‰), accounting for 12.28%. The combined burden from both constitutions was 26,780 DALYs (DALY rate: 27.10‰), representing 31.26% of the burden in this age group. Correspondingly, comprehensive correction of phlegm-dampness and yin-deficiency constitutions in the 60-69 age group could reduce the disease burden by 26,780 DALYs, or 27.10 DALYs per 1,000 people [TABLE:5-6].

Gender-Specific Risk Constitutions and Attributable Burden

When stratified by gender, phlegm-dampness constitution was a risk factor for middle-aged and older males ($RR=2.29$, $P<0.01$), while yin-deficiency constitution was a risk factor for females ($RR=2.27$, $P<0.01$). Phlegm-dampness constitution contributed 45,017 DALYs (DALY rate: 30.96‰) in males, accounting for 36.82% of the male disease burden. Yin-deficiency constitution contributed 28,753 DALYs (DALY rate: 18.43‰) in females, accounting for 20.79% of the female disease burden [TABLE:7-9].

Discussion

Heavy Disease Burden of Wasting Thirst Disorder in Guangzhou's Middle-Aged and Older Adults

This study revealed a wasting thirst disorder prevalence of 13.08% (standardized: 12.64%) among middle-aged and older adults in Guangzhou, with a DALY rate of 86.64‰, indicating a substantial disease burden. This burden exceeds previous estimates for diabetes mellitus in Guangzhou from our research group, suggesting that assessments using ICD-11 and national TCM standards better reflect TCM clinical realities. The higher DALY rate in females compared to males, and the increasing burden with age, indicate that women and the oldest-old are priority populations for prevention and control in Guangzhou. The higher YLL rate in males suggests that preventing mortality-related burden should be prioritized for men, while the higher YLD rate in females indicates that addressing disability-related health loss is more critical for women. The greater YLD than YLL demonstrates that disability contributes more substantially to the burden than mortality, highlighting the need to leverage TCM's advantages in chronic disease management to improve quality of life and reduce disability impact.

Yin-Deficiency and Phlegm-Dampness Constitutions as Risk Factors

Composite constitutions were more prevalent than single constitutions in Guangzhou's middle-aged and older population, consistent with previous research. The constitution distribution differed between wasting thirst disorder patients and healthy individuals, with higher proportions of qi-deficiency, phlegm-dampness, and yin-deficiency constitutions among patients, confirming that TCM constitution influences disease susceptibility. At the population level, yin-deficiency constitution emerged as the primary risk constitution, validating TCM pathogenesis theory. According to *TCM Internal Medicine*, insufficient endowment represents the first etiological factor: "The kidney is the root of congenital constitution, housing original yin and original yang, and governing essence storage. Kidney yin deficiency is the most critical factor in wasting thirst pathogenesis. Those with congenital insufficiency and yin-deficiency constitution are most susceptible. When kidney yin is deficient, water exhausts and fire blazes, scorching heart and lung upward causing excessive thirst,

burning stomach and spleen midward causing voracious hunger. When the kidney loses nourishment, its opening and closing functions fail, causing water and grain essence to discharge directly downward with urine, resulting in sweet-tasting urine.” This study quantitatively demonstrates this congenital factor from a statistical perspective and indirectly validates the scientific rigor of the TCM constitution scale developed by Academician WANG Qi’s team.

Age- and Gender-Specific Focus Areas for Constitution Regulation

Stratifying by age and gender revealed that phlegm-dampness constitution is also a risk factor for wasting thirst disorder in the 60-69 age group and among middle-aged and older males. Research by HAN Wentan from Beijing University of Chinese Medicine indicates that the essential pathogenesis of diabetes involves “water deficiency-fire excess-phlegm exuberance.” LI Hong et al. identified yin-deficiency and phlegm-dampness as the most common biased constitutions associated with wasting thirst disorder. LEI Xin from Shanxi University of Chinese Medicine reported that phlegm-dampness constitution is the primary constitution type in elderly diabetes patients and can be regulated using “phlegm-dampness constitution conditioning formulas.” Our findings support these perspectives. Therefore, in “treating before disease” and TCM health management for wasting thirst disorder, special attention should be paid to correcting biases in yin-deficiency and phlegm-dampness constitutions. Yin-deficiency constitution requires calming the mind and consuming more kidney-yin-nourishing foods, while phlegm-dampness constitution should avoid fatty, sweet, and raw foods, abstain from smoking and alcohol, avoid prolonged residence in damp environments, and engage in appropriate physical exercise.

The 60-69 age group represents the critical period for regulating phlegm-dampness and yin-deficiency constitutions. Males require more attention to phlegm-dampness constitution, while females need more focus on yin-deficiency constitution. Although TCM emphasizes “yin-yang balance” and constitution regulation should span entire populations comprehensively, identifying specific population priorities enhances cost-effectiveness. Our results suggest targeting phlegm-dampness constitution in males and yin-deficiency constitution in females to reduce their DALY values, thereby improving the efficiency of TCM health management.

Strengthening TCM Constitution Monitoring and Management Under Standardized Frameworks Can Effectively Reduce Wasting Thirst Disorder Burden

Overall, yin-deficiency constitution contributed 33,092 DALYs to wasting thirst disorder burden in middle-aged and older adults, representing 33,092 disability-adjusted life years of health loss to society due to constitution bias. This demonstrates that comprehensive TCM health management and constitution monitoring can reduce wasting thirst disorder burden, underscoring the value of TCM constitution regulation in disease prevention and treatment. These findings

provide statistical evaluation and decision-making evidence for applying TCM constitution theory in health management and clarify the significance of constitution monitoring and management. Further improvement and implementation of ICD-11 and national TCM standards to enhance TCM standardization and normalization are fundamental for better data statistics and effective monitoring of TCM risk factors.

This study has limitations. The lack of long-term cohort data on TCM constitution prevented direct RR calculation, necessitating correction using formulas. However, no formula can substitute for complete original data. Future research should address this gap. Currently, primary healthcare institutions in China have gradually incorporated TCM constitution assessment into physical examination programs, and health management departments can also conduct TCM constitution evaluations. With ICD-11 implementation, more standardized research data will strengthen the evidence base. Additionally, this study did not account for potential interactions between different constitutions, which may introduce bias.

Author Contributions: ZHAO Lanhui conceptualized and designed the study, implemented the research, collected and analyzed data, and drafted the manuscript. GAO Jing participated in data collection and revised the manuscript. ZHOU Shangcheng was responsible for quality control and review, overall article responsibility, and supervision.

Conflict of Interest: The authors declare no conflicts of interest.

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