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Original Article

Rapid fire needling combined with Xiaoliu Jin Jianwei decoction improves gastrointestinal symptoms and gastric mucosal lesions in chronic atrophic gastritis

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Abstract: Objective: To investigate the efficacy of rapid-fire needling combined with Xiaoliu Jin Jianwei Decoction in chronic atrophic gastritis (CAG) and explore factors influencing the therapeutic effect. Methods: A total of 187 CAG patients admitted to our hsopital from April 2022 to April 2024 were divided into a control group (n=81, Xiaoliu Jin Jianwei Decoction alone) and an observation group (n=106, combined therapy), both receiving conventional drugs. After 4-weeks of treatment, GSRS score, total effective rate, gastric mucosal histopathology score and inflammatory factors were compared. Univariate and multivariate Logistic regression identified the influencing factors; a Nomogram model was constructed and verified by receiver operating characteristic (ROC) and calibration curves. Results: The observation group showed lower GSRS, histopathology scores, high-sensitivity C-reactive protein (hs-CRP) and tumor necrosis factor-α (TNF-α) levels, and higher total effective rate (93.40% vs 71.60%) than the control group (all $P<0.05$), with no difference in adverse reactions ($P>0.05$). GSRS score, histopathology score, hs-CRP, TNF-α and dietary habits were independent risk factors for poor efficacy. The Nomogram model had good predictive accuracy. Irregular diet was associated with higher GSRS, hs-CRP and TNF-α ($P<0.05$). Conclusion: Combined therapy effectively improves gastrointestinal symptoms, reverses gastric mucosal lesions and enhances efficacy in CAG with good safety. The aforementioned indicators and dietary habits are key influencing factors.

Keywords: Rapid fire needling, Xiaoliu Jin Jianwei decoction, chronic atrophic gastritis, gastrointestinal symptoms, gastric mucosal histopathology, prognostic analysis

Introduction

Chronic Atrophic Gastritis (CAG) is a prevalent chronic digestive disorder clinically, characterized by typical symptoms such as abdominal pain, distension, and anorexia [1]. Closely linked to Helicobacter pylori infection, this condition often induces gastrointestinal dysfunction; in severe cases, it may lead to anemia or even carcinogenesis, thereby endangering patients' lives and impairing their quality of life [2]. Currently, modern medical interventions include pharmacological treatments (e.g., antacids, antibiotics, gastric mucosal protectants) and interventional procedures like endoscopic submucosal dissection and endoscopic mucosal resection. However, these approaches primarily alleviate superficial symptoms and have limited efficacy in reversing pathological alterations such as intrinsic gastric mucosal gland atrophy and intestinal metaplasia. Additionally, some patients still experience unsatisfactory outcomes following long-term treatment, with a high recurrence rate [3, 4]. Therefore, integrating multidisciplinary advantages and exploring multimodal combination therapies for CAG has become a key focus of clinical research.

Traditional Chinese Medicine (TCM), a time-honored medical system developed in China, focuses on human physiology, pathology, diagnosis, and treatment, and has long played a pivotal role in safeguarding public health [5]. In TCM theory, CAG is categorized as "stomach

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stuffiness" (Weipi) or "epigastric pain" (Weiwantong), among other designations. Spleen-stomach damp-heat syndrome is one of the common TCM patterns, with core pathogenesis involving spleen-stomach weakness that leads to internal stagnation of water-dampness. Prolonged dampness retention transforms into heat, resulting in accumulation of damp-heat pathogens in the spleen and stomach - thus, the primary therapeutic principle centers on clearing heat and eliminating dampness [6, 7]. Xiaoliu Jin Jianwei Decoction, a TCM formula, comprises herbs including Radix Codonopsis (Dangshen), Rhizoma Atractylodis Macrocephalae (Baizhu), Poria cocos (Fuling), Radix Linderae (Wuyao), and Pericarpium Citri Reticulatae (Chenpi). It exerts effects of clearing heat, resolving dampness, regulating qi, and relieving pain, serving as a solid formulaic foundation for TCM treatment of CAG [8]. Fire needling, a distinctive external TCM therapy, involves quickly puncturing acupoints with a specially crafted needle heated to red heat. This technique directly warms and dredges meridians, promotes blood circulation to dispel stasis, enhances resistance to dispel pathogens, and exerts a beneficial regulatory effect on gastrointestinal function [9, 10]. However, systematic research on the combined efficacy of these two interventions for CAG remains limited. Their effects on gastrointestinal symptoms, gastric mucosal pathology, and inflammatory factors are not fully understood, and the key factors influencing therapeutic outcomes still require further exploration.

This study aims to compare the clinical efficacy of rapid-fire needling combined with Xiaoliu Jin Jianwei Decoction versus Xiaoliu Jin Jianwei Decoction alone, with a focus on analyzing evidence-based clinical data on gastrointestinal symptom scores, gastric mucosal pathological changes, and inflammatory factor levels in the two patient groups.

Materials and methods

Case selection

From April 2022 to April 2024, a total of 187 patients with CAG admitted to Qingyang Hospital of Traditional Chinese Medicine, were enrolled. Based on variations in their prior clinical treatment regimens, they were divided into two groups: the control group (n=81) treated with Xiaoliu Jin Jianwei Decoction alone, and the observation group (n=106) who received additional rapid fire needling therapy. Both groups underwent consecutive treatment for 4 weeks. Inclusion criteria: meeting the diagnostic criteria for chronic atrophic gastritis; aged 18-70 years; good treatment compliance, with the ability to cooperate in completing relevant examinations and treatment; normal communication skills and the ability to accurately express their discomfort. Exclusion criteria: incomplete clinical data; receiving any treatments other than those specified in this study during the study period; with underlying diseases affecting drug metabolism, such as cardiovascular and cerebrovascular diseases or malignant tumors. The study flow is shown in **Figure 1**. This study was approved by the Ethics Committee of Qingyang Hospital of Traditional Chinese Medicine.

Data collection

(1) Gastrointestinal Symptom Rating Scale (GSRS) [11]: The GSRS scores of the two groups of patients were collected and compared before treatment and 4 weeks after treatment to evaluate the severity of gastrointestinal symptoms. This rating scale mainly consists of 15 items, and each item is scored from 0-3 according to its severity. The higher the score, the more severe the symptoms.

(2) Efficacy evaluation [12]: The treatment effects of the two groups of patients 4 weeks after treatment were collected and compared. The criteria are as follows: After 4 consecutive weeks of treatment, patients whose symptoms and signs such as edema, loss of appetite, abdominal pain, and distension are largely eliminated, and whose gastric mucosal dysplasia disappears are considered as marked effective; patients with mild edema, congestion, loss of appetite, etc. in the gastric mucosa and significant improvement after 4 consecutive weeks of treatment are considered effective; patients with no obvious improvement or aggravated disease after 4 consecutive weeks of treatment are considered ineffective. The total effective rate = [(number of cases with marked effective + number of cases with effective)/ total number of cases] × 100%.

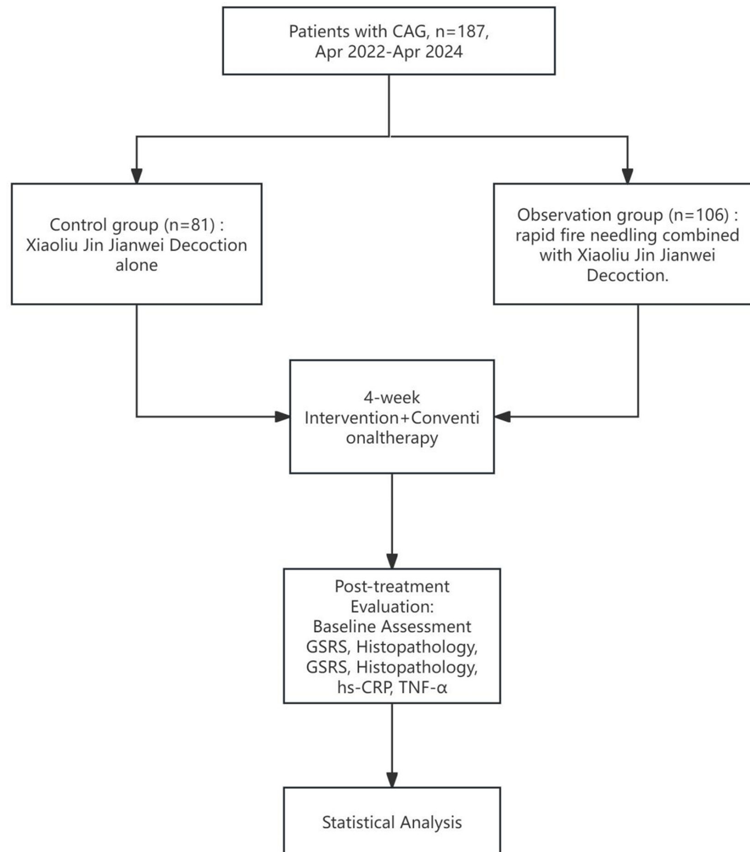

Figure 1. Study protocol flowchart.

(3) Gastric mucosal histopathology scores [12]: The gastroscopy results of the two groups of patients before treatment and 4 weeks after treatment were collected and compared, and the gastric mucosal tissues of the two groups were pathologically scored. The scoring includes four aspects: intestinal epithelial metaplasia, mucosal inflammation, inflammatory activity, and glandular atrophy. Each item is scored according to its severity, with 0 points for none, 1 point for mild, 2 points for moderate, and 4 points for severe. The total score is 16 points, and the higher the score, the more severe the disease.

(4) Inflammatory factors: The expression levels of inflammatory factors, tumor necrosis factor-α (TNF-α) and high-sensitivity C-reactive protein (hs-CRP), in the two groups of patients before treatment and 4 weeks after treatment were collected and compared. The above factors were detected by enzyme-linked immunosorbent assay (ELISA).

(5) Adverse reactions: The occurrence of adverse reactions during the treatment of the two groups of patients was collected and compared, and the incidence rate was calculated.

Statistical methods

SPSS 20.0 software was employed for statistical analyses. Measurement data were expressed as ($\bar{x}\pm s$), and the comparison of means between groups was performed using the independent samples t-test, and the comparison of indicators at different time points in a group, was compared using the paired t test: intergroup comparisons of means were conducted via independent samples t-test, while intragroup comparisons of indicators across different time points were analyzed with the paired t-test. Count data were presented as n (%), and intergroup comparisons were performed using the χ^2 test. A multivariate Logistic regression model was utilized to identify factors influencing therapeutic outcomes in CAG patients. Additionally, the "rms" package in R version 3.5.2 was used to construct a nomogram prediction model based on independent influencing factors of therapeutic effect. Calibration curves and receiver operating characteristic (ROC) curves were generated to validate the model. A *P*-value <0.05 was considered statistically significant.

Results

Comparison of general data between the two groups

As shown in **Table 1**, there were no significant differences in general data indicators - including gender, age, body mass index (BMI), smoking history, family history, hypertension, diabetes mellitus, hyperlipidemia, and dietary habits - between the observation group and the control group (P>0.05).

Table 1. Comparison of general data between the two groups [n (%), $\bar{x}$±s]

Basic Characteristics	Observation Group (n=106)	Control Group (n=81)	t/χ^2	P
Gender			1.806	0.179
Male	55 (51.89)	50 (61.73)		
Female	51 (48.11)	31 (38.27)		
Age (yrs)	68.01±5.08	68.10±4.43	0.127	0.899
BMI (kg/m^2)	23.06±2.89	23.15±2.51	0.223	0.824
Smoking			3.716	0.054
Yes	40 (30.58)	42 (34.91)		
No	66 (69.42)	39 (65.09)		
Alcohol Consumption			0.001	0.981
Yes	63 (59.43)	48 (59.26)		
No	43 (40.57)	33 (40.74)		
Hypertension			0.306	0.580
Yes	76 (71.70)	61 (75.31)		
No	30 (28.30)	20 (24.69)		
Diabetes			0.174	0.616
Yes	40 (37.74)	33 (40.74)		
No	66 (62.26)	48 (59.26)		
Hyperlipidemia			0.045	0.832
Yes	52 (49.06)	41 (50.43)		
No	54 (50.94)	40 (49.57)		
Dietary habits			0.534	0.465
Irregular	19 (17.92)	18 (22.22)		
Regular	87 (82.08)	63 (77.78)		

Comparison of inflammatory factor levels between the two groups before and after treatment

As shown in **Figure 3**, before treatment, there were no significant differences in the levels of hs-CRP (**Figure 2A**) or TNF-α (**Figure 2B**) between the two groups (P>0.05). One month after treatment, the levels of these inflammatory factors significantly decreased in both groups; furthermore, the levels of hs-CRP and TNF-α in the observation group were significantly lower than those in the control group (P<0.05).

Comparison of the incidence of adverse reactions between the two groups

As presented in **Table 3**, the incidence of adverse reactions in the observation group was 5.66% (6/106), which showed no significant difference from that in the control group (9.88%, 8/81) (P>0.05).

Comparison of GSRS scores and gastric mucosal histopathology scores between the two groups before and after treatment

As presented in **Figure 2**, before treatment, there were no significant differences in GSRS or Gastric Mucosal Histopathology Scores between the two groups (P>0.05). After 4 weeks of treatment, both scores significantly decreased in both groups; notably, the GSRS score and Gastric Mucosal Histopathology Scores in the observation group were significantly lower than those in the control group (P<0.05).

Comparison of total effective rate of treatment between the two groups

As indicated in **Table 2**, after 4 weeks of treatment, the total effective rate of the observation group was 93.40% (99/106), which was significantly higher than that of the control group (71.60%, 58/81) (P<0.05).

Univariate analysis of factors influencing patients' therapeutic effect

As indicated in **Table 4**, the results of univariate analysis showed no significant differences in gender, age, BMI, smoking history, drinking history, hypertension, diabetes mellitus, or hyperlipidemia between the ineffective group and the effective group (P>0.05). However, the ineffective group had significantly higher GSRS scores, higher Gastric Mucosal Histopathology Scores, higher hs-CRP levels, higher TNF-α levels, and a larger number of patients with poor dietary habits compared with the effective group (P<0.05).

Multivariate logistic regression analysis of factors influencing patients' therapeutic effect

Factors with significant differences identified in the univariate analysis were selected for further analysis. Assignment was performed based on the cut-off values of GSRS, Gastric

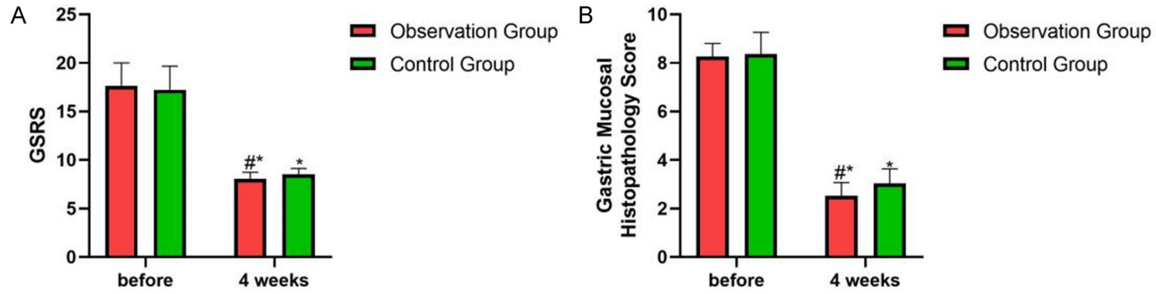

Figure 2. GSRS scores and gastric mucosal histopathology scores: (A) GSRS of two groups; (B) Gastric mucosal histopathology scores of two groups. *, # mean compared with before and control group P<0.05.

Table 2. Comparison of total effective rate of treatment between the two groups [n (%)]

Group	n	Marked effective	Effective	Ineffective	Total effective rate
Observation Group	106	69 (65.09)	30 (28.30)	7 (6.60)	99 (93.40)
Control Group	81	30 (37.04)	28 (34.57)	23 (28.40)	58 (71.60)
χ^2					13.038
P					<0.001

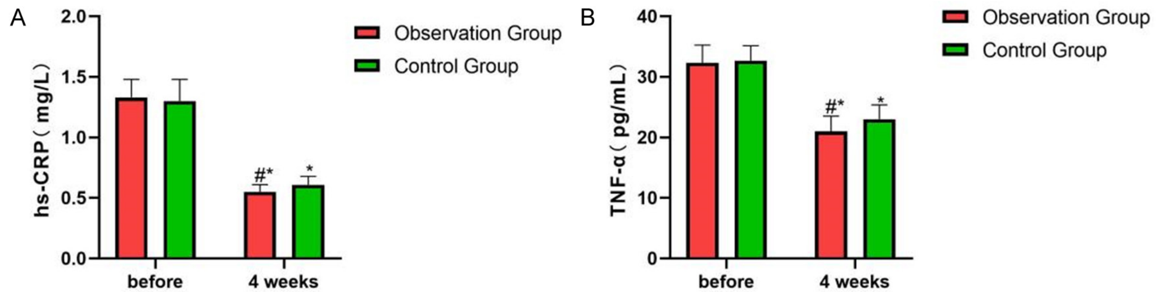

Figure 3. Inflammatory factor levels: (A) hs-CRP of two groups; (B) TNF-α of two groups. *, # mean compared with before and control group P<0.05.

Table 3. Comparison of the incidence of adverse reactions between the two groups [n (%)]

Group	n	Nausea and vomiting	Abdominal pain and diarrhea	Dizziness and headache	Rash	Incidence of adverse reactions
Observation Group	106	2 (1.89)	4 (3.77)	0 (0.00)	0 (0.00)	6 (5.66)
Control Group	81	2 (2.47)	3 (3.70)	2 (2.47)	1 (1.23)	8 (9.88)
χ^2						1.178
P						0.278

Mucosal Histopathology Scores, hs-CRP, and TNF-α, as well as the regularity of dietary habits; the detailed assignment criteria are shown in **Table 5**. The results of multivariate Logistic regression analysis (**Table 6**) revealed that GSRS ≥8.5, Gastric Mucosal Histopathology Scores ≥3.5, hs-CRP ≥0.615 mg/L, TNF-α ≥23.72 pg/mL, and irregular dietary habits were independent risk factors for poor therapeutic effect in patients.

Construction of nomogram model and evaluation of predictive efficacy

Based on the results of multivariate Logistic regression analysis (**Table 6**), variable assignment criteria (**Table 5**), combined with the weight calibration of the nomogram model, a mathematical prediction formula for the risk of poor therapeutic outcomes in CAG patients was further derived: $\text{Logit}(P)=\beta_0+1.490X_1+2.08$

Table 4. Univariate analysis of factors influencing patients' therapeutic effect [n (%), $\bar{x}$±s]

	Ineffective Group (n=30)	Effective Group (n=157)	t/χ^2	*P*
Gender			0.549	0.459
Male	15 (50.00)	90 (57.32)		
Female	15 (50.00)	67 (42.68)		
Age (years)	68.33±4.71	67.99±4.83	0.355	0.723
BMI (kg/m²)	23.46±2.67	23.03±2.74	0.791	0.430
Smoking			0.215	0.643
Yes	12 (40.00)	70 (44.59)		
No	18 (60.00)	87 (55.41)		
Alcohol Consumption			0.234	0.629
Yes	19 (63.33)	92 (58.60)		
No	11 (36.67)	65 (41.40)		
Hypertension			3.208	0.073
Yes	18 (60.00)	119 (75.80)		
No	12 (40.00)	38 (24.20)		
Diabetes			0.489	0.485
Yes	10 (33.33)	63 (40.13)		
No	20 (67.67)	94 (59.87)		
Hyperlipidemia			0.585	0.444
Yes	13 (43.33)	80 (50.96)		
No	17 (56.67)	77 (49.04)		
Dietary habits			25.338	<0.001
Irregular	16 (53.33)	21 (9.43)		
Regular	14 (46.67)	136 (90.57)		
GSRS	8.93±0.53	8.13±0.63	6.524	<0.001
Gastric Mucosal Histopathology Score	3.40±0.62	2.62±0.54	7.075	<0.001
hs-CRP (mg/L)	0.65±0.08	0.56±0.06	7.107	<0.001
TNF-α (pg/mL)	24.52±2.52	21.35±2.36	6.668	<0.001

Table 5. Assignment of influencing factors

Influencing Factors	Assignment
GSRS	0: <8.5
	1: ≥8.5
Gastric Mucosal Histopathology Score	0: <3.5
	1: ≥3.5
hs-CRP	0: <0.615 mg/L
	1: ≥0.615 mg/L
TNF-α	0: <23.72 pg/mL
	1: ≥23.72 pg/mL
Dietary habits	0: Regular
	1: Irregular

$6X_2+1.419X_3+1.490X_4+1.635X_5$ in order to quantitatively assess individual risk. As shown in the nomogram (**Figure 4A**), the Gastric Mucosal Histopathology Score was the most strongly correlated indicator influencing patients' therapeutic effect, while GSRS, hs-CRP, TNF-α, and dietary habits were strongly correlated indicators - all of which contributed substantially to risk prediction. Validation results of the nomogram demonstrated that the area under the curve (AUC) of the ROC curve (**Figure 4B**) was 0.896 (95% confidence interval [95% CI]: 0.813-0.979), and the slope of the calibration curve (**Figure 4C**) was close to 1.

ROC curves of various risk factors for evaluating patients' therapeutic effect

With patients' therapeutic effect (ineffective/effective) as the state variable and the factors with significant differences identified in Section 2.7 as the test variables, ROC curves were plotted, and the AUC was calculated. The results are shown in **Table 7** and **Figure 5**.

Table 6. Multivariate logistic regression analysis of factors influencing patients' therapeutic effect

Influencing Factors	β	Std. Error	Wald χ^2	P	HR	95% CI	
						Lower	Upper
GSRS ≥8.5	1.490	0.638	5.460	0.019	4.438	1.271	15.488
Gastric Mucosal Histopathology Score ≥3.5	2.086	0.995	4.393	0.036	8.054	1.145	56.652
hs-CRP ≥0.615 mg/L	1.419	0.610	5.406	0.020	4.132	1.250	13.665
TNF-α ≥23.72 pg/mL	1.490	0.594	6.295	0.012	4.437	1.385	14.210
Dietary habits: Irregular	1.635	0.619	6.991	0.008	5.132	1.527	17.250

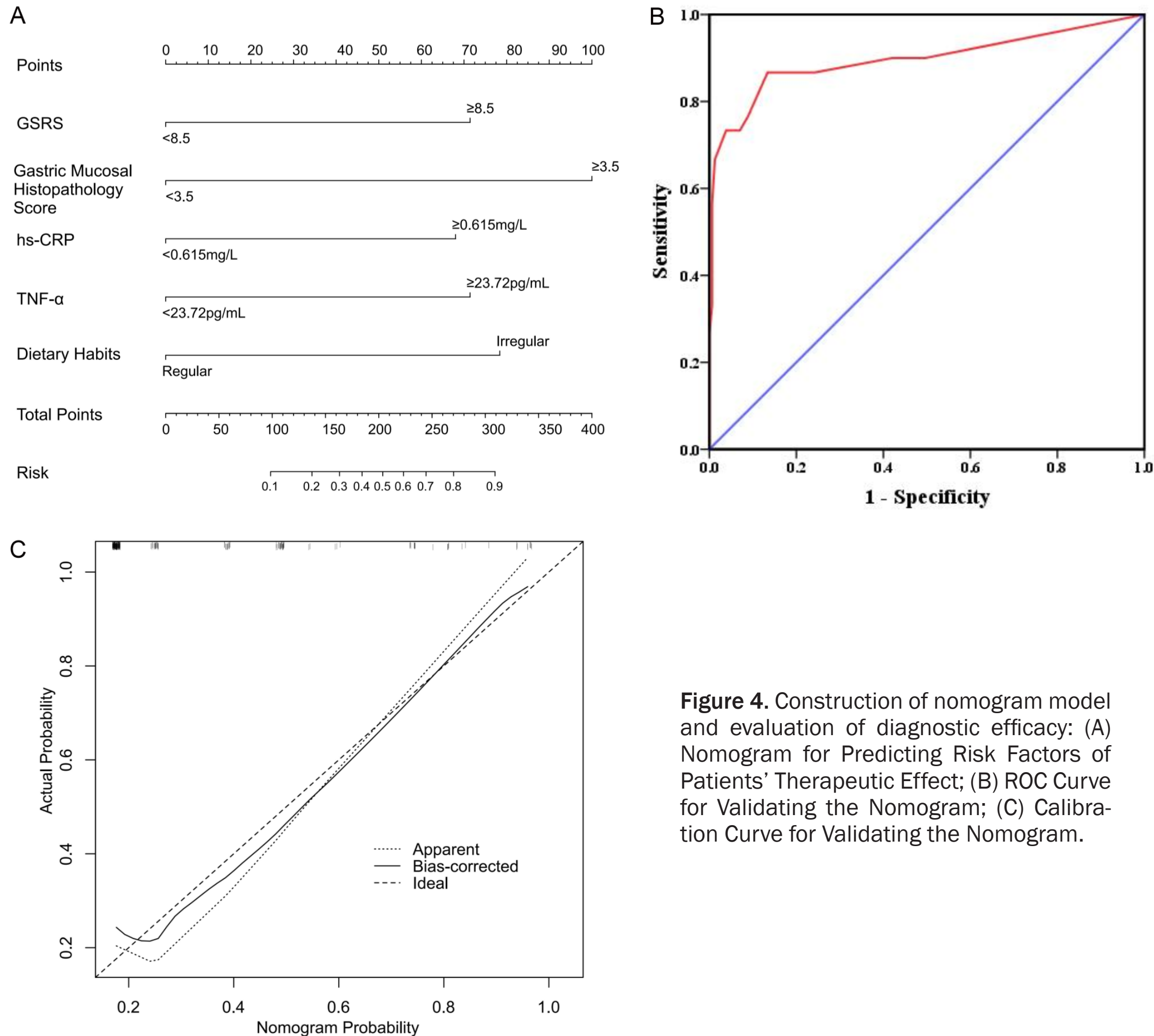

Figure 4. Construction of nomogram model and evaluation of diagnostic efficacy: (A) Nomogram for Predicting Risk Factors of Patients' Therapeutic Effect; (B) ROC Curve for Validating the Nomogram; (C) Calibration Curve for Validating the Nomogram.

Comparison of GSRS, gastric mucosal histopathological scores, and inflammatory factor levels before and after treatment in patients with different dietary habits

As shown in **Table 8**, there were no significant differences in GSRS, gastric mucosal histopathological scores, hs-CRP, or TNF-α levels between the two groups of patients before treatment (P>0.05). After 4 weeks of treatment, both scores were significantly decreased in both groups; additionally, the levels of GSRS, hs-CRP, and TNF-α in the Irregular Diet Group were significantly higher than those in the Regular Diet Group (P<0.05), whereas no significant difference was observed in gastric mucosal histopathological scores between the two groups (P>0.05).

Table 7. ROC curve results of each risk factor for evaluating patients' therapeutic effect

Influencing Factors	AUC	Sensitivity	Specificity	*P*	95% CI	Cut-off Value	Youden Index
GSRS	0.812	0.833	0.758	<0.001	0.732-0.892	8.5	0.591
Gastric Mucosal Histopathology Score	0.791	0.400	0.981	<0.001	0.703-0.879	3.5	0.381
hs-CRP	0.845	0.700	0.841	<0.001	0.763-0.927	0.615 mg/L	0.541
TNF-α	0.839	0.667	0.879	<0.001	0.760-0.918	23.72 pg/mL	0.546
Dietary habits	0.71	0.533	0.866	<0.001	0.586-0.814	-	0.399

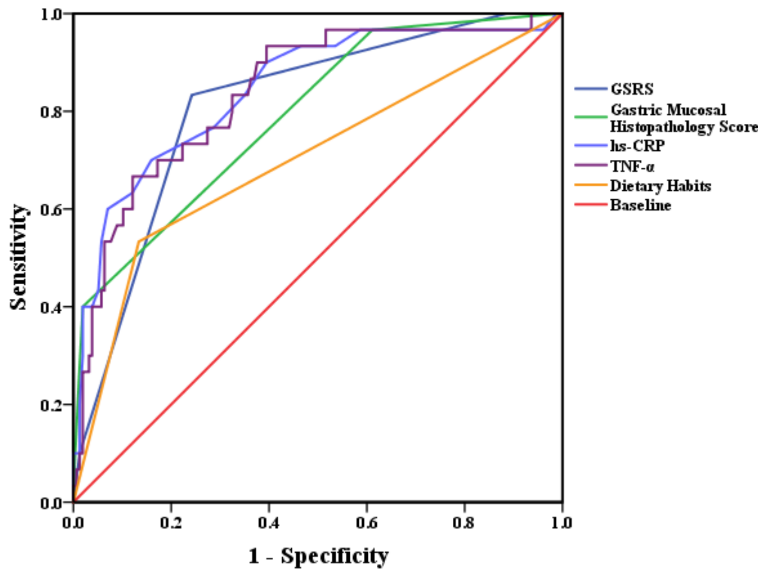

Figure 5. ROC curves of various risk factors for evaluating patients' therapeutic effect.

Discussion

CAG is widely recognized as a precancerous lesion of gastric cancer, with an annual progression rate to gastric cancer of 0.1%. The incidence rates at 1-year, 5-year, and 10-year follow-ups are 0.3%, 0.6%, and 0.8%, respectively. Thus, implementing effective therapeutic interventions for CAG is crucial for reducing gastric cancer incidence [13]. Clinically, the core goal of CAG treatment is to alleviate clinical symptoms, reverse gastric mucosal pathological damage, and block CAG progression to cancer. In recent years, TCM and its therapies have shown substantial clinical efficacy in CAG treatment [14, 15]. This study compared the therapeutic effects of rapid-fire needling combined with Xiaoliu Jin Jianwei Decoction versus Xiaoliu Jin Jianwei Decoction alone. The results confirmed the advantages of this TCM-based regimen for CAG, identified independent risk factors influencing therapeutic efficacy, and established a predictive model - thereby providing evidence-based support and practical tools for personalized clinical management of CAG.

Our findings demonstrated that after treatment, both the GSRS and Gastric Mucosal Histopathology Score in the observation group were significantly lower than those in the control group, and the total effective rate was significantly higher than that in the control group. This is consistent with the observations of Zhang et al. [16], indicating that the combined therapy of rapid-fire needling and Xiaoliu Jin Jianwei Decoction can improve patients' gastrointestinal symptoms and pathological damage. In TCM theory, CAG is categorized as "Weipi" (stomach stuffiness) or "Weiwantong" (epigastric pain), with spleen-stomach damp-heat being a common TCM pattern. The core pathogenesis involves spleen-stomach weakness accompanied by damp-heat accumulation. Xiaoliu Jin Jianwei Decoction, as used in this study, contains: Dangshen (Radix Codonopsis), Baizhu (Rhizoma Atractylodis Macrocephalae), and Fuling (Poria cocos) to invigorate the spleen and tonify qi; Huanglian (Rhizoma Coptis Chinensis), Huangqin (Radix Scutellariae Baicalensis), and Yinchen (Capillary Wormwood Herb) to clear heat and resolve dampness; Wuyao (Radix Linderae) and Chenpi (Pericarpium Citri Reticulatae) to regulate qi and relieve pain. This formula aligns perfectly with the therapeutic principle of "clearing heat, resolving dampness, invigorating the spleen, and harmonizing the stomach" [17-19]; rapid fire needling at acu-

Table 8. Comparison of GSRS, gastric mucosal histopathological scores, and inflammatory factor levels before and after treatment in patients with different dietary habits

Group	n	GSRS		Gastric Mucosal Histopathology Score		hs-CRP (mg/L)		TNF-α (pg/mL)	
		Before	4 weeks	Before	4 weeks	Before	4 weeks	Before	4 weeks
Irregular	37	17.27±2.35	8.46±0.69*	8.30±0.77	2.89±0.81*	1.30±0.18	0.60±0.09*	32.36±3.06	22.71±3.01*
Regular	150	17.53±2.33	8.21±0.67*	8.31±0.70	2.71±0.56*	1.32±0.16	0.57±0.07*	32.52±2.63	21.64±2.52*
t		0.607	2.021	0.076	1.590	0.664	2.199	0.321	2.223
P		0.545	0.045	0.939	0.114	0.508	0.029	0.749	0.027

*Mean compared with before P<0.05.

points including Shangwan (CV13), Zhongwan (CV12), and Zusanli (ST36) exerts effects of "warming and dredging meridians, promoting blood circulation to dispel stasis" while directly regulating gastrointestinal qi movement. This external therapeutic action, combined with the internal regulatory effect of the decoction, achieves a synergistic effect of "dredging meridians externally and regulating zang-fu organs internally" [20]. From a modern medical standpoint, fire needling stimulation activates local neurohumoral regulatory pathways, thereby promoting gastrointestinal hormone secretion and gastrointestinal motility recovery [21, 22]; the herbal components of the decoction accelerate gastric mucosal regeneration by regulating the expression of mucosal repair-related factors [23]; the synergy between these two interventions significantly strengthens the capacity to reverse pathological damage in patients.

Uncontrolled inflammatory response is a key pathological basis for persistent gastric mucosal damage in CAG, and various inflammatory factors play critical roles in the occurrence and progression of gastritis [24]. Among these factors, TNF-α can activate the body's inflammatory response; elevated TNF-α expression accelerates gastric mucosal damage, induces gastric mucosal traumatic bleeding, and promotes cell death through its immunomodulatory effects. By contrast, hs-CRP is clinically used as a sensitive indicator for evaluating the degree of systemic inflammation, with significantly increased levels in cases of chronic inflammation and tissue damage [25]. Our results showed that hs-CRP and TNF-α levels decreased in both groups after treatment, but the reduction was more pronounced in the observation group, indicating that the combined regimen has stronger anti-inflammatory activity. We analyzed the underlying mechanism as follows: berberine and baicalin in Xiaoliu Jin Jianwei Decoction can directly inhibit the nuclear factor-kappa B signaling pathway, thereby reducing the expression of pro-inflammatory factors such as TNF-α [26]. Furthermore, rapid fire needling can regulate macrophage polarization, decrease pro-inflammatory factor secretion, and enhance the anti-inflammatory microenvironment [27]. Under the synergistic action of these two interventions, the inflammatory response is further suppressed; while alleviating mucosal inflammation, the vicious cycle of "inflammation-oxidative stress" is attenuated, thereby delaying or even reversing gastric mucosal atrophy. This study also found that no significant difference was observed in the incidence of adverse reactions between the observation group and the control group, with no serious adverse events reported. Potential reasons for this include: the fire needling procedure is of short duration and minimal trauma, reducing the risk of local infection and bleeding; meanwhile, the formulation of Xiaoliu Jin Jianwei Decoction balances "clearing heat" and "warming yang", avoiding impairment of spleen-stomach function caused by heat-clearing agents alone [28].

Multivariate Logistic regression analysis identified that GSRS ≥8.5, gastric mucosal histopathological score ≥3.5, hs-CRP ≥0.615 mg/L, TNF-α ≥23.72 pg/mL, and irregular dietary habits were independent risk factors for poor therapeutic outcomes. The nomogram model constructed based on these factors, along with its validation results, demonstrated good predictive accuracy and consistency. This is consistent with the findings of Fukuda et al. [29], indicating that the severity of gastric mucosal glandular atrophy and intestinal metaplasia has a relatively direct influence on therapeutic efficacy. Furthermore, comparative anal-

ysis of data from patients with different dietary habits revealed that after 4 weeks of treatment, GSRS, hs-CRP, and TNF-α levels were significantly higher in the Irregular Diet Group than in the Regular Diet Group, whereas no significant difference was observed in gastric mucosal histopathological scores between the two groups. This suggests that dietary habits exert a phase-specific influence on the treatment course of CAG. The underlying mechanism is analyzed as follows: dietary habits can modulate gastric acid secretion and gastrointestinal motility - prolonged fasting is prone to induce gastric acid erosion, while overeating tends to cause mechanical irritation to the gastric mucosa, both of which significantly hinder the improvement of CAG symptoms; irregular dietary habits are also likely to induce a cascade of disorders in the intestinal microecology-barrier-inflammation pathway, thereby triggering intestinal flora imbalance and barrier impairment, which in turn compromises inflammation alleviation; glandular atrophy and intestinal metaplasia in CAG patients result from long-term chronic damage [30]; 4 weeks of treatment can alleviate superficial mucosal inflammation but exerts no significant effect on the repair of deep glandular structures [31].

This study still has several limitations. First, this was a single-center retrospective study with a modest sample size, which may introduce selection bias into the results. Second, the long-term risk of CAG progression to gastric cancer was not assessed. Third, the specific molecular targets underlying the combined regimen's regulation of inflammatory factors were not thoroughly investigated. For future research, multi-center, large-sample prospective cohort designs are recommended, with prolonged follow-up to confirm the long-term efficacy and safety of the combined regimen. Additionally, further investigation into the regulatory mechanisms of the combined regimen on inflammation-related signaling pathways is warranted.

In conclusion, rapid fire needling combined with Xiaoliu Jin Jianwei Decoction effectively ameliorates gastrointestinal symptoms and gastric mucosal pathological damage in CAG patients with favorable safety profiles, supporting its clinical application. The GSRS, gastric mucosal histopathological score, hs-CRP level, TNF-α level, and dietary habits are key factors affecting therapeutic efficacy, and these indicators merit attention in clinical prognostic assessment.

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Disclosure of conflict of interest

None.

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