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ORIGINAL RESEARCH

Disparities in Knowledge, Attitudes, and Practices Regarding Rheumatoid Arthritis Between Han and She Ethnic Groups in Ningde City, Eastern Fujian, China: A Cross-Sectional Study

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Background: Rheumatoid arthritis (RA) poses significant health challenges worldwide. However, little is known about disparities in knowledge, attitudes, and practices (KAP) regarding RA among ethnic minorities in China. This study aimed to compare KAP outcomes between Han and She ethnic groups and to explore the influencing factors.

Methods: A cross-sectional study was conducted among residents of Ningde City, Fujian Province, China, between June 2023 and January 2024.

Results: A total of 546 valid questionnaires were collected. The mean knowledge, attitude, and practice scores for the total sample were 8.85±5.85, 41.10±6.56, and 16.47±3.91, respectively. Han participants exhibited significantly higher attitude (44.02±6.49 vs. 40.46±6.40, P<0.001) and practice scores (17.41±4.15 vs. 16.25±3.82, P=0.005) than She participants, although knowledge scores were slightly lower among Han (7.85±3.60 vs. 9.06±6.21, P=0.119), although this difference was not statistically significant (P = 0.119). Structural equation modeling analysis revealed that education was positively associated with knowledge (β = 1.53, P < 0.001), while knowledge (β = 0.40, P < 0.001) and ethnicity (β = 4.04, P < 0.001) showed direct paths to attitudes. Furthermore, attitudes (β = 0.25, P < 0.001) and income (β = 0.64, P < 0.001) were independently associated with practices.

Conclusion: Residents in Ningde City demonstrated generally adequate knowledge and positive attitudes towards RA but only moderate levels of proactive practices. Ethnic disparities were observed, with Han participants showing better attitudes and practices than She participants. Targeted educational interventions that consider ethnic and socioeconomic differences are warranted to enhance RA management outcomes in minority communities.

Keywords: knowledge, attitude, practice, rheumatoid arthritis, ethnic minority, cross-sectional study

Introduction

Rheumatoid arthritis (RA) is recognized as a chronic systemic autoimmune disease, notable for its enigmatic etiology. Globally, its prevalence is estimated to range from 0.4% to 1.3%, highlighting its significance as a major public health concern.[1] In China, rheumatoid arthritis represents a significant and growing public health concern. Recent epidemiological analyses estimate that RA affects approximately 0.34%–0.42% of the Chinese population, corresponding to more than 4–5 million individuals nationwide, and the overall disease burden has increased steadily over the past decades.[2,3] But specific data on RA prevalence or healthcare access in minority populations are limited. In the absence of timely and effective treatment, RA is characterized by persistent synovitis and the erosion of articular cartilage and adjacent bone.

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This progression leads to significant joint damage, diminished mobility, and a notable decline in the quality of life. Moreover, individuals with RA face an elevated risk of cardiovascular diseases and various other extra-articular complications.[4,5]

In the context of China's diverse population, the 2000 census recorded 709,592 individuals from the She ethnic minority, with approximately 375,193 (52.87%) residing in Fujian Province (https://en.wikipedia.org/wiki/She_people). Ethnic minorities, which represent about 8.5% of China's total population, showcase significant cultural distinctions from the ethnic Han majority.[6] These differences encompass folk customs, languages, religious beliefs, food habits, and values.[7] These cultural distinctions extend to perceptions and understandings of health and disease. Previous studies have indicated that ethnic minorities may hold distinct beliefs regarding disease etiology, symptoms, treatment preferences, and prognosis, which in turn influence their health-seeking behaviors and treatment adherence.[8,9] The impact of these cultural variations on health outcomes is profound, as illustrated by a study on Tibetan highlanders. This study revealed a remarkably high estimated prevalence of rheumatoid arthritis, with 4.3% of males and 7.1% of females affected, underscoring the potential influence of ethnic and cultural factors on health.[8] Our study targeted Eastern Fujian, China, where a significant She ethnic minority population resides alongside the Han majority, providing an opportunity to explore potential ethnic disparities in RA-related KAP. Prior research has noted that minority groups in China often face structural barriers such as lower average socioeconomic status, reduced access to specialty healthcare, and limited availability of culturally tailored health information, all of which may contribute to disparities in health outcomes, including chronic disease management such as hypertension, diabetes, and cardiovascular diseases.[6,7]

The Knowledge, Attitude, and Practices (KAP) study is esteemed as a pivotal diagnostic tool in research, designed to shed light on a group's understanding, beliefs, and behaviors regarding a particular subject, especially in the context of health literacy. It operates on the foundational belief that enhanced knowledge invariably leads to more positive attitudes, which subsequently shape healthier behaviors.[10–12] The research aims to unearth specific knowledge deficits and cultural perceptions related to RA among the She ethnic minority. Garnering such insights is crucial for the development of culturally tailored healthcare interventions aimed at bolstering RA awareness, prevention, and management. These interventions seek to mitigate health disparities and promote equitable health outcomes within the mosaic of China's population. Although several studies have examined health disparities among ethnic minorities in China, most have focused on conditions such as hypertension, diabetes, or general health service utilization, while very few have specifically investigated musculoskeletal or autoimmune diseases among these populations.[13,14] Existing evidence suggests that cultural beliefs, language barriers, and limited exposure to health education may influence disease awareness and care-seeking behaviors among minority groups. However, no prior research has explored disparities in RA-related knowledge, attitudes, and practices among the She population. The present study addresses this gap by providing empirical data on RA-related KAP differences between the Han majority and the She minority, contributing to a more nuanced understanding of minority health challenges in China.

Material and Methods

Study Design and Participants

This cross-sectional study was conducted between June 2023 and January 2024. Residents in Ningde City of Eastern Fujian, China were included. A "resident" was defined as an individual who had lived in Ningde City for at least 6 months prior to participation, regardless of household registration status.[15] This study was approved by the Medical Scientific Research Ethics Review Committee of our hospital, and all participants provided written informed consent. Exclusion criteria include: (1) the questionnaire completion time is obviously too short and the quality of the answers cannot be guaranteed; (2) the respondents are under 18 years old; (3) the questionnaire contains logical contradictions or has a consistent answer pattern in the trap questions.

Questionnaire Design

The questionnaire design (Supplementary materials) was informed by existing literature, and subsequent input was sought from two senior experts. Following the design phase, a pilot study (n = 74) demonstrated good overall reliability

(Cronbach's α = 0.841), with subscale values of 0.883 for Knowledge, 0.813 for Attitude, and 0.578 for Practice. Cronbach's α was calculated using Stata 17.0. The final questionnaire (Supplemental Figure 1) encompassed four dimensions: demographic information, knowledge, attitude, and practice. The Knowledge dimension assessed participants' understanding of rheumatoid arthritis, including disease definition, risk factors, clinical manifestations, diagnosis, and treatment options (K1-K13). The Attitude dimension measured perceptions of disease severity, beliefs regarding treatment and prognosis, and willingness to seek care (A1-A10). The Practice dimension captured health-related behaviors, including healthcare-seeking patterns, adherence to follow-up, and treatment preferences (P1-P7). The knowledge dimension consisted of 13 questions, each scored with one point for a correct response and zero for an incorrect or unclear answer. The 13th question was unscored, resulting in a total score range of 0 to 12 points. Notably, questions 3, 4, and 7/11 had option b as the correct answer, while the remaining questions had option a. A score below 9 indicated insufficient knowledge, whereas 9 to 12 points signified adequate knowledge. In the attitude dimension, 10 questions were structured using a five-point Likert scale. Positively framed questions ranged from 1 (strongly disagree) to 5 (strongly agree), while negatively framed questions were scored in reverse, from 5 to 1. Total scores ranged from 10 to 50 points. Similarly, the practice dimension comprised 7 questions, employing a five-point Likert scale. Scores ranged from 5 to 25 points, with item 1 having options a = 5 and b = 1. For positively framed questions, scores ranged from 5 to 1, and for negatively framed questions, scores ranged inversely from 1 to 5. Items P6 and P7 were designed to capture participants' preferences regarding the type of department and hospital level they would choose when experiencing recurrent joint symptoms. Because these items reflect healthcare-seeking preferences rather than behavioral frequency or intensity, they were not included in the calculation of the practice score and were analysed descriptively. The questionnaire's internal consistency was evaluated using Cronbach's α to assess reliability, with results of 0.883 for the Knowledge subscale, 0.813 for Attitude, and 0.578 for Practice. Analyses were conducted using Stata 17.0.

Questionnaire Distribution and Quality Control

The electronic questionnaire was hosted on Sojump (http://www.sojump.com) and Yi Express (https://www.yibiaoda.com/). Participants were recruited using a convenience sampling approach, and the survey link was disseminated through community networks, social media platforms, and local contacts in Ningde City. The questionnaire link was distributed to participants. All data were collected anonymously, and to prevent duplication, IP restriction was applied, allowing only one completion of the survey from a single IP address.

To ensure data integrity, trap questions K7 and K13 were implemented, with responses indicating all-a or all-b being excluded from analysis. To ensure data integrity, trap questions (K7 and K13) were included to detect uniform or inconsistent responses. Questionnaires with abnormal response patterns were excluded based on pre-established criteria, and details of the exclusion process are provided in the Results section. To ensure data integrity, several predefined exclusion criteria were applied. Questionnaires with completion times shorter than 60 seconds on the Sojump platform or 90 seconds on the Yi Express platform were excluded, as these durations were considered insufficient for reliable completion of the survey.

To further evaluate the internal consistency and item discrimination of the questionnaire, corrected item-total correlation coefficients were calculated for each item within the Knowledge, Attitude, and Practice subscales. For the Knowledge subscale, corrected item-total correlations ranged from 0.336 to 0.650. For the Attitude subscale, values ranged from 0.370 to 0.636. For the Practice subscale, corrected item-total correlations ranged from 0.168 to 0.503. Most items across all three domains demonstrated acceptable correlations (>0.30), supporting satisfactory item discrimination and internal consistency of the instrument. However, a small number of Practice items (P1 and P2) showed relatively lower correlations, suggesting heterogeneity in behavioral constructs captured within the Practice domain (Supplemental Table 1).

Statistical Analysis

Statistical analysis was conducted using Stata 17.0 (Stata Corporation, College Station, TX, USA). Continuous variables were described using mean ± standard deviation (SD), and between-group comparisons were performed using *t*-tests or analysis of variance (ANOVA). Categorical variables were presented as n (%). Spearman rank correlation was employed

to explore relationships among knowledge, attitude, and practice scores. The relationships among demographic information (including ethnicity), knowledge, attitude, and practice were examined using structural equation modeling (SEM). The SEM was developed based on the classical KAP framework, which assumes that knowledge influences attitudes, which in turn shape practices.[16] The model incorporated pathways from demographic variables (including ethnicity, education level, and income) to knowledge, attitudes, and practices, consistent with established health behavior theories. The initial (unadjusted) model was specified according to this theoretical structure, and model fit indices. Model refinement was conducted by combining statistical results with theoretical justification, whereby non-significant or weak paths were removed only when not supported by established KAP theory or prior literature, to improve model parsimony while maintaining conceptual validity. Existing evidence supports these pathways, showing that ethnicity, education, income, and related sociodemographic factors are associated with differences in health knowledge, attitudes, and practices.[17,18]

Given the imbalance in sample size between the She and Han groups, a post-hoc power analysis was conducted for the primary between-group comparisons using Cohen's d. Effect sizes were calculated for all group comparisons. Cohen's d was used for t-tests and interpreted as small (0.2), medium (0.5), and large (0.8), while eta squared (η^2) was used for ANOVA and interpreted as small (0.01), medium (0.06), and large (0.14).

Model fit was evaluated using the root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), comparative fit index (CFI), and Tucker–Lewis index (TLI). Two-sided $p<0.05$ were considered statistically significant in this study.

Results

A total of 758 responses were initially collected. The following samples were excluded during data screening: (1) one questionnaire with a response time of less than 60 seconds and three questionnaires with a response time of less than 90 seconds (applicable to Questionnaire Star only); (2) 101 questionnaires from respondents younger than 18 years, including two extreme outliers; (3) 13 questionnaires in which respondents selected both "a. No" and other options for the item "Do you have other rheumatic and immune diseases?" (multiple selections allowed), indicating inconsistent responses; and (4) 90 questionnaires in which respondents selected either "a" or "b" for all trap questions, suggesting uniform answering patterns. After applying these criteria, a total of 546 valid responses were included for analysis. Among the participants, 448 (82.05%) were of She ethnicity, 316 (57.88%) were female, and the mean age was 36.94 ± 12.49 years. Sixty-six individuals (12.09%) had been diagnosed with RA.

Comparison of KAP Scores Between Han and She Ethnic Groups

The knowledge, attitude, and practice scores for the total sample were 8.85±5.85, 41.10±6.56, and 16.47±3.91, respectively. Stratified by ethnicity, She participants had a slightly higher mean knowledge score (9.06±6.21) than Han participants (7.85±3.60), although the difference was not statistically significant (P = 0.119). In contrast, Han participants demonstrated significantly higher attitude scores (44.02±6.49 vs. 40.46±6.40, P < 0.001) and practice scores (17.41±4.15 vs. 16.25±3.82, P = 0.005) compared to She participants (Tables 1 and 2).

Post-hoc power analysis indicated that the statistical power was high for attitude (power = 0.999, Cohen's d = −0.553) and acceptable for practice (power = 0.765, Cohen's d = −0.299), supporting the robustness of these findings. In contrast, the power for knowledge was relatively low (power = 0.459, Cohen's d = 0.207), consistent with the non-significant difference observed between groups (P = 0.119) (Supplemental Table 2). Most observed effects were small to moderate in magnitude. Ethnic differences showed a moderate effect size for attitude (d = 0.553) and a small-to-moderate effect for practice (d = 0.299), whereas the effect size for knowledge was small (d = 0.207), consistent with the lack of statistical significance (Supplemental Table 3).

The distribution of knowledge dimension revealed that the question with the highest number of participants choosing the "Correct" option were "If there are suspected symptoms of rheumatoid arthritis, one should seek consultation with a rheumatology specialist." (K9), with 74.73%. The question with the highest number of participants choosing the "Incorrect" option were "Men can also develop rheumatoid arthritis." (K3), with 70.33%. The question with the highest

Table 1 Demographic Characteristics and KAP Scores

N=546	N (%)	Knowledge Score		Attitude Score		Practice Score	
		Mean ± SD	P	Mean ± SD	P	Mean ± SD	P
Total score		8.85±5.85		41.10±6.56		16.47±3.91	
Age (years)	36.94±12.49						
Gender			**0.027**		0.054		0.112
Male	230(42.12)	8.21±5.97		40.4±6.78		16.16±3.99	
Female	316(57.88)	9.31±5.72		41.61±6.35		16.68±3.83	
Marital status			**0.002**		0.054		0.437
Unmarried/Divorced/Widowed	188(34.43)	9.97±6.20		40.27±6.97		16.26±3.75	
Married	358(65.57)	8.25±5.57		41.54±6.30		16.57±3.99	
Ethnicity			0.119		**<0.001**		**0.005**
She	448(82.05)	9.06±6.21		40.46±6.40		16.25±3.82	
Han	98(17.95)	7.85±3.60		44.02±6.49		17.41±4.15	
Residential area			0.350		0.464		0.063
Rural/She Ethnic Group Settlement Village	205(37.55)	8.56±6.14		40.72±6.32		16.03±3.70	
Urban	205(37.55)	9.28±5.75		41.20±6.70		17.00±4.13	
Suburban/She-Han Mixed Townships	136(24.91)	8.62±5.53		41.52±6.70		16.30±3.80	
Education			**<0.001**		**<0.001**		0.063
Primary school and below	66(12.09)	5.95±4.28		40.51±6.36		15.46±3.77	
Junior high school	114(20.88)	6.50±5.36		39.77±6.26		16.39±3.77	
High school/technical school	120(21.98)	8.53±5.94		40.79±6.90		16.24±3.93	
College/bachelor's degree	224(41.03)	10.9±5.53		42.40±6.42		16.97±3.96	
Master's degree and above	22(4.03)	9.81±6.77		38.27±5.91		15.86±3.87	
With family member working in the medical system			**<0.001**		**0.005**		**0.006**
Yes	126(23.08)	10.7±5.73		41.46±6.93		17.43±4.17	
No	420(76.92)	8.27±5.77		40.99±6.44		16.17±3.78	
Monthly household income per capita, Yuan			**<0.001**		**0.005**		**<0.001**
<2000	97(17.77)	6.48±5.31		39.60±6.82		15.56±3.97	
2000–5000	242(44.32)	8.54±5.78		41.11±6.28		15.87±3.62	
5000–10,000	159(29.12)	10.5±5.62		42.23±6.44		17.52±3.91	
10,000–20,000	31(5.68)	11.2±6.05		41.93±6.63		17.96±4.62	
>20,000	17(3.11)	6±5.09		37.35±7.59		17.29±3.25	
Type of health insurance			**0.001**		**<0.001**		**0.011**
Solely Social Medical Insurance (e.g., Employee Medical Insurance, "New Rural Cooperative Medical Scheme," "Urban Residents Basic Medical Insurance," etc.)	416(76.19)	8.92±5.78		41.37±6.45		16.37±3.76	
Solely Commercial Medical Insurance	12(2.2)	6.33±4.11		33.08±4.75		13.75±3.22	
Both Social Medical Insurance and Commercial Medical Insurance	84(15.38)	10.1±5.89		42.04±6.14		17.51±4.27	
None	34(6.23)	5.67±5.81		38.32±7.02		15.88±4.35	
Smoking			**0.001**		**0.011**		0.117
Never Smoked	442(80.95)	9.27±5.83		41.52±6.41		16.64±3.91	
Former Smoker, Now Quit	48(8.79)	7.79±5.49		39.62±7.34		15.5±3.82	
Current Smoker	56(10.26)	6.41±5.65		39.03±6.55		15.91±3.81	
Alcohol consumption			0.694		0.063		0.298
Yes	206(37.73)	8.71±6.01		40.41±6.64		16.25±3.91	
No	340(62.27)	8.92±5.75		41.52±6.48		16.59±3.90	

Notes: The bolded P values indicate statistical significance at the threshold of less than 0.05.

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Table 2 Clinical Characteristics and KAP Scores

N=546	N (%)	Knowledge Score		Attitude Score		Practice Score	
		Mean ± SD	P	Mean ± SD	P	Mean ± SD	P
Diagnosis and duration of rheumatoid arthritis			0.595		**0.045**		**0.011**
No, Never Diagnosed	480(87.91)	8.77±5.94		40.86±6.57		16.27±3.89	
Yes, Diagnosed Within the Last Year	19(3.48)	10.4±5.86		42.57±6.89		18.63±3.28	
Yes, Diagnosed Over 1 Year But Less Than 3 Years Ago	10(1.83)	8.3±5.12		45.8±3.25		18.4±4.19	
Yes, Diagnosed 3 Years Ago or More	37(6.78)	9.18±4.76		42.18±6.41		17.24±3.84	
Family history of rheumatoid arthritis			0.453		0.175		0.123
Yes	211(38.64)	9.07±5.47		41.64±6.20		16.06±3.94	
No	335(61.36)	8.71±6.07		40.76±6.76		16.71±3.87	
Comorbidity with other rheumatic immune diseases (multiple choice)							
None	269(49.27)						
Psoriasis	12(2.2)						
Ankylosing Spondylitis	22(4.03)						
Systemic Lupus Erythematosus	26(4.76)						
Scleroderma	7(1.28)						
Other	10(1.83)						
Comorbidity with other diseases (multiple choice)							
None	485(88.83)						
Tuberculosis	9(1.65)						
Viral Hepatitis (Hepatitis A/B/C/D/E)	31(5.68)						
Neoplastic Diseases	15(2.75)						
Other	23(4.21)						

Notes: The bolded P values indicate statistical significance at the threshold of less than 0.05.

number of participants choosing the "Uncertain" option were "High levels of rheumatoid factor indicate rheumatoid arthritis." (K11), with 49.82% (as shown in Supplemental Table 4).

Responses to the item on attitudes towards rheumatoid arthritis showed that 62.45% strongly agreed that prevention and early diagnosis are very important (A2), and 61.36% strongly agreed that once diagnosed, the disease should receive standardised treatment, with regular monitoring and long-term follow-up (A6). Concurrently, 52.2% strongly disagreed that joint pain and inflexibility are normal in old age and do not need to go to the hospital (A1), 52.38% strongly disagreed that the disease is incurable and requires medication so there is no need to go for check-ups (A3), as well as 50.18% strongly disagreed that the disease is just a pain and that painkillers are sufficient (A5) (as shown in Supplemental Table 5).

When it comes to related practices, 39.01% have medical check-ups, but not regularly (P1), and 38.1% go to the hospital as soon as possible when they have joint pain or immobility when they get up (P2). When it comes to folk remedies (P4) and traditional Chinese medicine (P5), about 70% of the participants were neutral or did not prefer them. When having recurrent joint swelling and pain, 64.47% would prefer to go to a tertiary hospital first (P7), and 63% would prefer to go to the rheumatology department first (P6) (as shown in Supplemental Table 6).

Correlation and SEM Analysis

Correlation analyses revealed significant positive associations between knowledge and attitude ($r = 0.3364$, $P < 0.001$), knowledge and practice ($r = 0.2854$, $P < 0.001$), and attitude and practice ($r = 0.4867$, $P < 0.001$) (Table 3).

An initial SEM model, including demographic variables such as gender, education, income, ethnicity, smoking status, and type of health insurance, was constructed. After removing statistically insignificant paths, the adjusted model demonstrated a good fit with the data (RMSEA = 0.043, SRMR = 0.028, TLI = 0.940, CFI = 0.966) (Table 4). In the

Table 3 Correlation Analysis

	Knowledge	Attitude	Practice
Knowledge	1		
Attitude	0.3364 (P<0.001)	1	
Practice	0.2854 (P<0.001)	0.4867 (P<0.001)	1

Table 4 Adjusted SEM Model Fit

Indicators	Reference	Results
RMSEA	<0.08 Good	0.043
SRMR	<0.08 Good	0.028
TLI	>0.8 Good	0.940
CFI	>0.8 Good	0.966

final adjusted SEM model (Figure 1 and Table 5), education was positively associated with knowledge (β = 1.53, P < 0.001). Knowledge (β = 0.40, P < 0.001) and ethnicity (β = 4.04, P < 0.001) both had direct paths to attitudes, while attitude (β = 0.25, P < 0.001) and income (β = 0.64, P < 0.001) were independently associated with practices. These results highlight the significant role of ethnic background in shaping attitudes towards RA, which subsequently impacts proactive practices. Detailed information on the initial unadjusted SEM model and its path coefficients is provided in Supplemental Tables 7 and 8.

Discussion

This study revealed significant differences in knowledge, attitudes, and practices (KAP) regarding rheumatoid arthritis (RA) between Han and She ethnic groups in Eastern Fujian. Han participants demonstrated higher attitude and practice scores compared to She participants, while no significant difference was observed in knowledge levels. SEM further confirmed that ethnicity had a direct path to attitudes, which were independently associated with practices. These findings suggest that targeted educational interventions are needed to address ethnic disparities in RA management, with particular attention to enhancing health awareness and promoting proactive behaviors among minority populations.

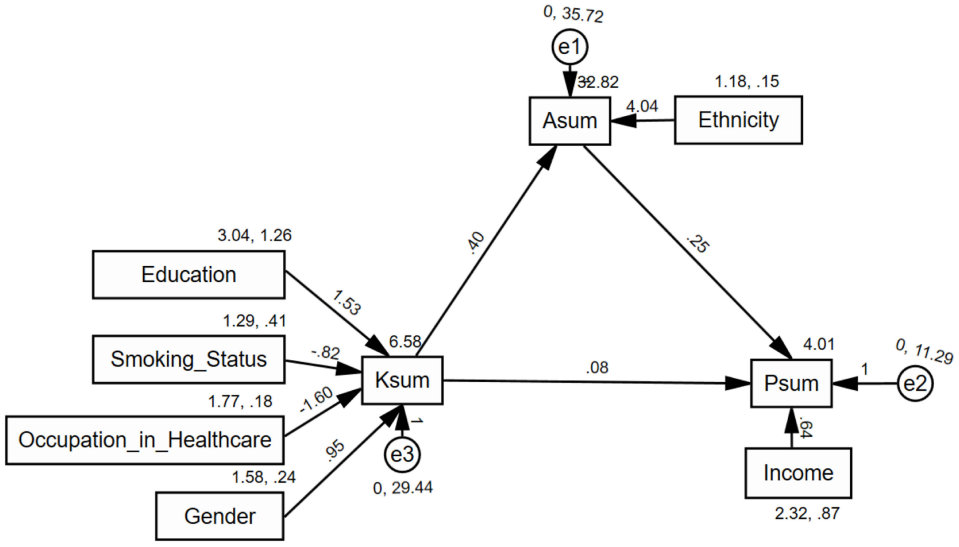

Figure 1 Adjusted SEM model (Removing variables with no statistical significance from the unadjusted model and refitting).

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Table 5 Adjusted SEM Model

		Estimate	P>|z|
A sum <-			
	K sum	0.40	**<0.001**
	Your Ethnicity	4.04	**<0.001**
P sum <-			
	A sum	0.25	**<0.001**
	K sum	0.08	0.003
	Income	0.64	**<0.001**
K sum <-			
	Gender	0.95	0.065
	Education	1.53	**<0.001**
	With family member working in the medical system	−1.60	0.005
	Smoking	−0.82	0.04

Notes: The bolded P values indicate statistical significance at the threshold of less than 0.05.

The residents in Ningde City of Eastern Fujian exhibit adequate knowledge, positive attitudes, and moderate practices regarding RA, which might be affected by their ethnicity and income. Given the favorable KAP scores observed, healthcare providers should focus on enhancing the accessibility of RA-related information and resources tailored to different ethnic communities, particularly emphasizing preventive measures and early intervention strategies that account for cultural differences.

The study's findings offer significant insights into the KAP regarding RA among residents in Ningde City of Eastern Fujian, with a particular focus on the She ethnic minority. These populations exhibit adequate knowledge, positive attitudes, and moderate practices towards RA, aligning with broader trends observed in healthcare education and behavior studies. For instance, the higher knowledge and practice scores among females compared to males echo findings from other regions and diseases, suggesting that women may be more proactive in seeking health information and adopting healthful behaviors.[14,19,20] The impact of marital status, with unmarried/divorced/widowed individuals showing higher knowledge scores, could reflect a greater self-reliance for health information and management. The significant variance in KAP scores across ethnic groups, with Han individuals scoring higher than the She ethnic group, may indicate underlying disparities in health education access, cultural attitudes towards health, and possibly systemic biases. In addition, differences in socioeconomic characteristics and health literacy may partially explain the observed disparities between the two ethnic groups. National reports on health literacy in China have documented marked regional and urban–rural gaps that track gradients in education, income, and health service availability, suggesting that populations in less developed or mountainous areas may have fewer opportunities to access and apply health information effectively.[21–23] These social determinants of health can shape how individuals perceive rheumatic symptoms, when they seek care, and whether they adhere to long-term treatment, and therefore provide an important contextual lens for interpreting the KAP differences observed in this study. Several factors may contribute to these disparities, including differences in educational attainment, access to specialized healthcare services, and culturally influenced perceptions of disease severity and treatment necessity. Compared to the Han majority, She communities may face greater barriers in receiving continuous health education and timely medical interventions. Therefore, future health promotion strategies should be culturally tailored, incorporating community-based outreach, multilingual educational materials, and collaboration with local health authorities to improve RA-related knowledge and care-seeking behaviors among She populations.

The SEM results further refine our understanding, indicating direct effects of education on knowledge, and of knowledge and ethnicity on attitude, as well as of attitude and income on practice. This suggests that educational interventions targeting RA awareness could be a crucial strategy in improving overall RA management, particularly in ethnic minority regions. The direct effect of income on practice points to the socioeconomic barriers in adopting recommended health practices.

In assessing participants' understanding of RA, it's evident that while some aspects are well-recognized, there are significant knowledge gaps. For instance, while there's a generally high awareness of RA as an autoimmune disease and its prevalence across different age groups and genders, misconceptions persist regarding its demographics and systemic effects. To address these gaps, targeted educational initiatives are essential. These initiatives should aim to correct misconceptions about the demographics of RA, emphasizing its potential impact on individuals of all ages and genders. Moreover, providing accessible resources such as informational pamphlets, online modules, and community workshops can help disseminate accurate information about RA, empowering individuals to recognize symptoms early and seek appropriate medical care.[24,25]

Participants' attitudes towards RA management reflect a mix of understanding and misconceptions. While many acknowledge the seriousness of RA and the importance of standardized treatment, there's a tendency to trivialize symptoms and skepticism towards seeking medical care and adhering to treatment regimens. To address these attitudes, interventions should focus on fostering a proactive approach to RA management. Public health campaigns should emphasize the potential consequences of untreated RA and highlight the benefits of early intervention and adherence to treatment. Additionally, healthcare providers should engage in patient-centered communication, addressing concerns and misconceptions to encourage active participation in treatment decisions.[26–28]

Participants' behaviors concerning RA prevention and management reveal a reliance on alternative therapies and delayed healthcare seeking behaviors. Moreover, preferences for certain healthcare providers and facilities may indicate gaps in referral pathways and access to specialized care. To address these challenges, interventions should focus on improving access to specialized rheumatology care and streamlining referral pathways.[29–31] This can involve initiatives such as implementing multidisciplinary care teams, expanding telemedicine services, and providing training for primary care providers on early recognition and management of RA.[32–34] Additionally, public health campaigns should promote evidence-based practices and empower individuals to take a proactive role in managing their RA.

An interesting pattern observed in this study is the apparent dissociation between knowledge and subsequent attitudes and practices among She participants. Although the She group demonstrated slightly higher knowledge scores than the Han group, the difference was not statistically significant, while their attitude and practice scores were significantly lower. This pattern suggests that knowledge alone may be insufficient to translate into positive attitudes or proactive health behaviours in certain populations. Several factors may contribute to this phenomenon. Structural barriers, such as reduced access to specialised rheumatology services, limited availability of culturally tailored health education, and differences in healthcare system navigation, may hinder the transformation of disease knowledge into healthcare-seeking behaviours. Socioeconomic factors may also play an important role, as individuals with lower income or fewer healthcare resources may face practical constraints in acting upon their health knowledge.[35,36] In addition, cultural perceptions of illness and treatment preferences may influence how individuals interpret symptoms and evaluate the necessity of medical care. These contextual factors may weaken the link between knowledge and behavioural outcomes within the KAP framework. Therefore, interventions aimed at improving RA management in minority populations should not focus solely on increasing knowledge but should also address structural and cultural barriers that affect attitudes and health-related practices.

Limitations of this study include the reliance on self-reported data, which may introduce response bias and affect the accuracy of the results. Participants were recruited using a convenience sampling strategy through community networks and online questionnaire platforms between June 2023 and January 2024, which may introduce selection bias by favoring individuals who are younger, more educated, and more digitally literate, thereby affecting the representativeness and generalizability of the findings. In addition, recruitment through hospital- and community-linked networks may have further contributed to selection bias. Moreover, the Han subgroup (n = 98) was substantially smaller than the She subgroup (n = 448), reflecting the local population structure but potentially affecting subgroup comparisons. This imbalance may reduce the precision of estimates for the Han group and influence the stability of structural equation modeling (SEM) path coefficients involving ethnicity. Therefore, findings related to ethnic differences should be interpreted with caution, and future studies with more balanced sampling across ethnic groups are warranted to confirm these associations. Furthermore, although the questionnaire demonstrated acceptable internal consistency, it did not undergo formal psychometric validation. The study was conducted in a specific geographical area among the She ethnic

minority, which may limit the generalizability of the findings to other regions and populations. In addition, the cross-sectional design provides only a snapshot of participants' KAP at a single point in time, limiting the ability to establish causal relationships.

Despite these limitations, this study provides a comprehensive investigation of KAP regarding rheumatoid arthritis among the She ethnic minority in Eastern Fujian, offering valuable insights into healthcare needs and perceptions within this community. The use of SEM further strengthens the analysis by enabling a rigorous examination of relationships between variables. While existing public health initiatives may have effectively disseminated essential information about rheumatoid arthritis, the observed disparities in attitudes and practices highlight the need for targeted interventions to translate knowledge into sustained positive health behaviors, particularly within minority populations.

Future research should adopt longitudinal or interventional designs to explore how KAP evolve over time and to assess the causal effects of targeted educational or behavioral interventions. Such designs would help clarify the mechanisms underlying the observed disparities between Han and She participants and determine whether improving knowledge can effectively translate into positive attitudes and proactive practices. Recruitment of larger and more balanced samples across ethnic groups is also essential to enhance the reliability of subgroup comparisons and improve the generalizability of findings. Complementary mixed-methods approaches, including qualitative interviews or focus groups, could provide deeper insights into cultural, social, and structural factors influencing RA-related attitudes and practices that quantitative measures alone may not capture. Finally, future studies should evaluate culturally and socioeconomically tailored interventions, such as community-based health education, multilingual resources, and locally adapted care pathways. Testing these strategies in minority populations can help determine their effectiveness in improving attitudes and practices, ultimately supporting more equitable and culturally sensitive management of rheumatoid arthritis.

Conclusions

In conclusion, residents in Ningde City of Eastern Fujian demonstrated adequate knowledge, positive attitudes, and moderate practices towards RA. While knowledge levels were comparable between Han and She ethnic groups, Han participants exhibited significantly higher attitude and practice scores than She participants. These findings suggest that ethnicity plays an important role in shaping health-related behaviors. Given these disparities, targeted educational interventions should focus on reinforcing positive attitudes and proactive practices, particularly among minority populations, to further improve RA management outcomes.

Abbreviations

RA, Rheumatoid arthritis; KAP, Knowledge, attitudes, and practices; SD, Standard deviation; SEM, Structural equation modeling; RMSEA, Root mean square error of approximation; SRMR, Standardized root mean square residual; CFI, Comparative fit index.

Data Sharing Statement

All data generated or analyzed during this study are included in this article.

Ethics Approval and Informed Consent

This work has been carried out in accordance with the Declaration of Helsinki (2000) of the World Medical Association. This study was approved by the Medical Scientific Research Ethics Review Committee of Mindong Hospital of Ningde City (2023031601K), and all participants provided written informed consent.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no competing interests in this work.

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